Liberia Electricity Regulatory Commission

LIBERIA ELECTRICITY CORPORATION DISTRIBUTION SERVICE AREA (MONTSERRADO COUNTY) INSPECTION REPORT

Submitted by:

The Technical Regulations Directorate (TRD)

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CONTENTS

1.0 Introduction

The Liberia Electricity Regulatory Commission (LERC) is mandated under Section 3.3 B (3)(4) of the 2015 Electricity Law of Liberia (ELL) to conduct audits and inspections of records, facilities, and equipment of licensees as well as to establish, maintain, review, and amend, as appropriate, customer care standards. The Electricity Distribution Code of Liberia (EDCL 16.22.1) mandates a Distribution Licensee to maintain its distribution network in accordance with good utility practice and performance standards to ensure reliability and quality of electricity service, on both a short-term and long-term basis.

In compliance with the 2015 ELL and the 2020 EDCL, the Inspectorate Unit of the Technical Regulation Directorate, assisted by the Public Affairs, inspected the Liberia Electricity Corporation Distribution service areas located in Montserrado County (Paynesville, Gardnerville, Stockton Creek, Bushrod, Kru Town, Capitol, Congo Town, Virginia, and Mt. Coffee Substations). As dictated by the Inspection Manual, the inspection began with an initial Opening Meeting held on May 1, 2025, at the LEC Bushrod Office and followed by field verification exercises on May 9-30, 2025, June 9 – 27, 2025, and July 7 – 24, 2025 respectively.

The Inspections were based on the identified indices and Regulatory Compliance Score Card outlined in Table 1.0 and Table 2.0.

1.1 Objectives of the Inspection

The Inspection exercises included Verification of Documents, Field inspection of the 66kVtransmission network, Field inspection of the 22kV medium voltage distribution network, Field inspection of the 0.4/0.23 kV low-voltage distribution networks, and evaluation of Safety coordination.

The inspections were conducted to accomplish the following objectives:

- To identify obvious structural problems and hazards such as leaning power poles, damaged equipment enclosures, and vandalism.
- To confirm operational equipment functionality and conformity to the technical and safety standards.
- To work with the licensed service provider in the development of a compliance Plan to cure problems identified during the inspections.
- To ensure that appropriate follow-up and corrective action is taken regarding problems identified so as to improve reliability and quality-of-service delivery to customers.
- To ensure licensed Service providers maintain their distribution network in accordance with good utility practice and performance standards for maintaining reliability and quality of electricity service, on both a short-term and long-term basis.

Table 1.0: Regulatory Compliance Score Card

No.	Compliance Status	Grading (%)	Rating	Risk level	Description	Action
1	Compliant (High)	95-100	1	Insignificant	Still operable.	**No Action**- capture that the asset is still in excellent working condition.
2	Compliant (Medium)	85-94	2	Low	Still operable with reduced performance.	**Noteworthy**- capture in the next inspection cycle and adjust ranking as needed.
3	Compliant (Low)	75-84	3	Medium	Still operable with degraded performance.	**Caution-** important action required to address identified issues.
4	Non-compliant	60-74	4	High	Almost inoperable, poor performance.	**Urgent**- Action required
5	Significantly non-compliant	0-59	5	Very high/ Already failed	Inoperable.	**Critical**- immediate action required.

***T*able 2.0: Overall Regulatory Compliance Score**

No.	Inspection Index	Compliance Status				
		1	2	3	4	5
1	**Overall Compliance**					

Table 3.0: Inspection Index

No.	Inspection Index
1	Documentation Checklist
2	Substation Checklist
3	High Voltage (66kV) Network Checklist
4	Medium Voltage (22kV) Network Checklist
5	Low voltage (0.4/0.230kV) Network Checklist
6	Transformer Checklist
7	Metering Checklist
8	Safety Coordination

2.0 Methodology

The inspections were carried out by both teams from the LERC and LEC. The below three core activities summarize the methodology followed during the inspection exercises.

a) **Preliminary Meeting -** The inspection commenced with a briefing session between the LERC and LEC teams. The LERC staff outlined the primary objectives of the inspection, emphasizing its significance in ensuring the reliability and quality of service delivery.

b) **Documentation Review -** Following the preliminary meeting, LEC was requested to submit the necessary documentation by the end of the inspection, as outlined in the Inspection Manual's “Documentation Checklist”. Reports were captured in their original forms to help the team ascertain and validate the integrity of data collected during the inspection exercise.

c) **Physical Inspection Using the Inspection Manual -** Field inspection was carried out using the checklists from the Inspection Manual, with random selection for inspection.

3.0 Summary of Regulatory Compliance scores for Inspections Conducted

Table 4 provides the summary of Regulatory compliance scores for inspections conducted from May to July 2025 in the selected areas of the LEC distribution service areas of Montserrado County. Table 5 provides the overall Regulatory Compliance score of LEC distribution service areas of Montserrado County for the same period under review.

Table 4.0: Summary of Regulatory Compliance Score Card

No.	Inspection Index	Compliance Status				
		1	2	3	4	5
1	Paynesville Network				X	
2	Gardnerville Network			X		
3	Stockton Creek Network			X		
4	Bushrod Network				X	
5	Kru Town Network		X			
6	Capitol Network			X		
7	Congo Town Network			X		
8	Virginia Network			X		
9	Mt. Coffee Network			X		

Table 5.0: Overall Regulatory Compliance Score of Montserrado Network Areas

No.	Inspection Index	Compliance Status				
		1	2	3	4	5
1	Overall Compliance of Montserrado Network			X		

The overall Compliance status of LEC selected distribution service areas inspected in Montserrado County is “Compliant Low”, risk level “Medium”, and is still operable with degraded performance. **Caution-**important action required to address identified issues. Refer to Table 1.0 for explanatory notes on the various ratings of the scorecard and Table 2.0 for the compliance rating.

4.0 Detail of the inspection exercise

4.1 Inspection Index Findings for Paynesville Distribution Network Corridors

(a) Documentation Checklist

The Documentation checklist is a list of documents that LEC is required to submit to the Liberia Electricity Regulatory Commission, demonstrating evidence of its documentation management system. Documentation management at the Paynesville feeder base business unit is lacking. During the inspection the following observations were made:

- ✓ In the Paynesville Distribution service areas, LEC does not know the number of distribution transformers on each feeder or the number of customers or loads connected to transformers.
- ✓ While a Network System Study is essential for real-time network planning, LEC lacks supporting documentation.
- ✓ The network is deteriorating rapidly on the Paynesville Redlight and Paynesville Gate 15 Feeders due to the absence of a Network Upgrade Plan.
- ✓ Although the utility performs partial maintenance on its network, it lacks a well-structured maintenance plan.

(b) Substation Checklist

Below are the current data provided for the Paynesville substation:

The number of power transformers	**1x13 MVA 1x12.5 MVA**
66kV OHL Feeders	9
66kV OHL capacity per Circuit	20 MW
Outgoing 22kV feeders	4X11 MW
Substation recorded peak load	14.9 MW
Spare 22kV breaker	2
Substation Installed Capacity	20 MW

The Paynesville Substation has three double circuits 66 kV incomers (Mt. Coffee to Paynesville, Gardnerville - Paynesville, and Congo Town - Paynesville). Additionally, there is one double-

circuit (Paynesville - Schiefflin) and one single-circuit (Paynesville - Kakata) 66 kV outgoing feeders. There are four outgoing 22 kV feeders at the Paynesville Substation.

During the inspection of the Paynesville substation, the following were observed:

- ✓ The Paynesville Substation has access to city water supply. However, there are no alternative source of supply or storage during nonavailability of city water supply.
- ✓ the internal perimeter of the substation control building is kept clean. However, the debris and dilapidated materials from the field are littered everywhere in the switchyard.
- ✓ The substation lacks a single line diagram of the network.
- ✓ There are no switching instructions in the substation.
- ✓ Of the two 22 kV spare breakers, the protection unit is removed from one.
- ✓ The Paynesville Substation does not have a fence and therefore vulnerable to unauthorized access
- ✓ There are no separate offices for the Management Unit, Operations Crew, Maintenance Crew, Metering Crew, Security and Substation Operators. These staff sit around on the concrete base under the old diesel generator structure.
- ✓ The security booth containerize office floor is broken and the chairs and desk are damaged.
- ✓ There is one bathroom for both males and females. This is observed very inadequate for the number of staffs stationed at the substation.
- ✓ The switchyard surface area is mostly bare due to inadequate crushed rocks.
- ✓ There is a register or logbook at the Substation. However, it does not include records of other parameters such as the Power frequency, the power factor, and the reactive power. Additionally, the operators do not indicate the reasons for which the feeders are de-energized. The operators also do not indicate the specific problems causing “Earth Fault’’ when identified by the field crew.
- ✓ Riser cables for the Paynesville - Congo Town 22 kV Feeder are not properly clamped to support structures and bare jumpers’ cables between the cut-outs and the lightning arresters are not concentric.
- ✓ The fire alarm system is disconnected.
- ✓ The Substation transformer blast wall is cracking, which is an identified Hazard.
- ✓ Some bays and equipment are not labelled in the switchyard.
- ✓ The outdoor lighting distribution box cover in the switchyard does not lock.
- ✓ There are several visible cracks on the civil structure of the new control building.

Paynesville Substation

(c) <u>High Voltage (66kV) Network Checklist</u>

There are nine 66 kV overhead circuits connected to the Paynesville Substation, of which four are double circuits and one is a single circuit. The 66 kV double circuits include the Paynesville - Gardnerville line measuring 9.457 km, the Paynesville - Congo Town line measuring 9.103 km, the Paynesville - Schiefflin line measuring 17.773 km, and the Paynesville - Mt. Coffee line measuring 26.23 km. The single circuit is the Paynesville to Kakata 66 kV line, which is 53.251 km long. The high-voltage 66 kV network consists of lattice towers and monopoles supporting 150 square millimeter AAAC cables.

During our inspections of these transmission structures, the following observations were made:

- ✓ The Network were observed to be in good operating conditions. However, vegetation management around towers is a challenge. Critical areas include riser cables on towers from Fendell to Gate 15.
- ✓ Most of the Paynesville - Mt. Coffee 66 kV tower foundations are being undermined by illegal soil mining activities.
- ✓ Encroachments are being made in all the corridors, and new structures are being built under the 66 kV overhead lines. Critical areas are the Paynesville - Kakata 66 kV Feeder, in Peace Community and King Farm where people have started building very close to some towers (66 kV) and putting blocks around some. Additionally, along the Paynesville - Congo Town 66 kV, one tower footings are being used for a vehicle parking and around other towers commercial activities were observed to be taking place.
- ✓ The 2nd circuit, Paynesville - Schiefflin 66 kV, is down/not operational due to a damaged riser cable.

Paynesville - Mt. Coffee 66 kV Tower

(d) Medium Voltage (MV) Network Checklist

The Paynesville Substation has four 22 kV feeders: the Paynesville - Duport Road Feeder spanning 38.931 Km; the Paynesville - Congo Town Feeder spanning 13.135 km; the Paynesville - Redlight Feeder spanning 18.051 km; and the Paynesville - Gate 15 Feeder spanning48.625 km. The lines are strung with 120 square millimeters AAAC cables. During inspections the following observations were made:

- ✓ Along the Paynesville - Duport Road and the Paynesville - Congo Town Feeders noticeable project intervention works of the KFW and European Union Projects were executed in locations along these feeders expanding the network.
- ✓ Road side network structures along Paynesville - Gate 15 remains partially in a good state of operation. However, many network structures are in a deplorable state at the back. For example, from the RITCO area towards Gate 15, badly leaning MV poles, longer spans of MV poles, inadequate sized MV poles, not properly sagged MV Conductors are among several issues observed.
- ✓ Wooden poles of smaller dimensions during construction were seen installed at light and heavy-angle areas. As a result, the mechanical stability and structural balance of the poles are failing. This situation is observed prevalent in places where smaller subcontractors' companies executed projects. for example, from the Duport Road junction using the bypass to Cool FM, Nimba United Community to name a few.
- ✓ On the Paynesville - Duport Road Feeder, between Duport and Zubah Town Community, there are several burnt poles carrying transformers and associated accessories.

- ✓ On the Duport Road - Congo Town Feeder at the back of Zone 5, there are several leaning MV Poles structure requiring urgent attention.
- ✓ On the Paynesville - Redlight Feeder, Police Academy, down the turning point, from the main road to JK Demeh Saah School, there are low MV lines, and erosion has undermined the MV poles on this extension.
- ✓ On the Paynesville - Redlight Feeder, Police Academy, Bassa Town, around the old NSA Building, there is an MV pole that is almost at breaking point due to inadequate guy installation.
- ✓ On the Paynesville - Redlight Feeder, around Bob Taylor fence, there is a de-commissioned monopole and a lattice tower carrying a cable. The cable is observed loosely attached and is a safety concern.
- ✓ On the Paynesville - Gate 15 Feeder along the Mt. Barclay highway, the Ritco dedicated transformer riser cable was observed arcing.
- ✓ On the Paynesville - Gate 15 Feeder at Nimba United, the MV spans are longer, providing low clearances (Conductor to ground). MV lines are being placed on the side of the pin-type or post insulators instead of being on top of the grooves of the pin-type or post insulators. Construction works in this area is poor and noncompliant to existing guidelines.
- ✓ On the Paynesville - Gate 15 Feeder at Nimba United, there is an abandoned MV network extension construction with cables lying on the ground. It was reported that this construction is illegal.
- ✓ On the Paynesville - Gate 15 Feeder at Chinese Estate, there exist several badly leaning MV and LV poles.
- ✓ On the Paynesville - Gate 15 Feeder, in Johnson Community (Gate 15), in an effort to address inadequate sagging of the conductors on the T-off to the community, one of the phase conductors is attached to a pin-insulator of a pole installed while the other two phases are left loosely sagged.
- ✓ On the Paynesville - Gate 15 Feeder, on Wukki Farm, the network is deplorable. A broken cross-arm, badly sagged MV lines, opened transformer breaker boxes, inadequate clearances between overlapping 22 kV lines, and poor vegetation management were observed.
- ✓ On the Paynesville - Gate 15 Feeder, at the Medical College in Fendell, most of the MV poles are badly leaning.

Leaning MV Pole at the Back of Kool FM

(e) Low Voltage Network Checklist

The 0.4/0.23kV network is partially maintained in some areas, specifically where projects were executed (Paynesville - Duport Road and Paynesville - Congo Town Feeders).

The Paynesville - Redlight and Paynesville - Kakata Feeders which are older networks are in the most deplorable conditions undermining the delivery of quality supply.

Below are details of several observations made during the inspection of the Low Voltage (LV) networks:

- ✓ The LV is constructed using varied sizes of ABC bundled conductors inappropriately.
- ✓ Across all four 22 kV feeders, abandoned old enclosures are still mounted on the poles.
- ✓ At the back of Kool FM in the Worldwide Community, there are leaning LV poles, and some are of very small dimensions.
- ✓ At Duport Road Junction, at the back of Kool FM, LV is strung on coconut trees.
- ✓ Between Duport Road and Rehab Community, there are several leaning LV poles.
- ✓ At Zubah Town Taxi Turning Point and Zubah Town Palm Wine Station, several LV poles are leaning. To correct these anomalies in some areas where replacement poles are installed, old poles are observed bonded to the replacement poles for support.
- ✓ Most of the streetlights on all feeders are operationally malfunctioning. While some were observed “ON” during the day, others are completely not operational. On the Duport Road

- Congo Town Feeder at the back Zone 5, there are leaning LV poles, and the LV conductors are attached to palm trees for support.

- ✓ On the Duport Road - Congo Town Feeder, in the GSA Road and Kissi Camp (Bhofal Chambers Road) Communities, low LV cables, leaning poles, and rotten poles were observed.
- ✓ On the Duport Road - Congo Town Feeder, between LBS and Lover Street, towards the GSA Road junction, there are many rotten LV poles in that corridor.
- ✓ The Paynesville - Redlight Feeder is in deplorable state; physical inspection shows that the network is old and most materials such as wooden poles, conductors, guys, etc. require urgent attention.
- ✓ Paynesville - Redlight Feeder at the Vogar Mission, beginning from Paynesville Town Hall area, shows that most of the LV poles are rotten and leaning, leading to low sagged LV cables.
- ✓ Paynesville - Redlight Feeder around the Tubman Methodist School, there are many old and abandoned poles.
- ✓ Paynesville - Redlight Feeder, 72nd New Eye Sight, and Bob Taylor communities to name a few, it was observed that LV networks are in very deplorable structural states.
- ✓ On the Paynesville - Gate 15 Feeder at Nimba United, there are low LV cables, burnt LV poles, and LV lines strung on wooden sticks and iron pipes.
- ✓ On the Paynesville - Gate 15 Feeder, from Cooper Farm junction to Gbelee Town, the LV from the 200 kVA transformer to the LV dead-end is more than 900m on one phase of the circuit.

Deplorable LV from LBS to GSA Road

(f) Transformer Checklist

The below observations were made during inspections at distribution transformers stations:

- ✓ Proper and consistent housekeeping remains a challenge. While some of the transformer stations are kept clean, others are very challenged with vegetation and missing breaker enclosure covers.
- ✓ A 200 kVA transformer around Redlight is leaking oil in the Outland Community (St. Kizito Catholic School).
- ✓ In Soul Clinic, particularly Kamah Town, New Guinea, Last Turning Point (AKA School), Several transformers' grounding systems are vandalized. very low LV conductors were observed. Among the several transformer stations visited, one 15 kVA transformer station in Kamah Town was damaged. It was reported by the Community that the damaged transformer has been there for over two years.
- ✓ On the Duport Road - Congo Town Feeder, LBS Community (Lover Street), there is a damaged 50 kVA transformer.
- ✓ On the Duport Road - Congo Town Feeder, in the LBS Community around PYJ Church, vegetation has over taken the transformer station.
- ✓ On the Duport Road - Congo Town Feeder, Rock Hill Community, there is a damaged 25 kVA transformer.
- ✓ Paynesville - Redlight Feeder at Vogar Mission (around the football field), there is a 250 kVA transformer that is leaning.
- ✓ Paynesville - Redlight Feeder at the Police Academy Watch Tower, there is a burnt H-framed transformer pole.
- ✓ Paynesville - Redlight Feeder, Police Academy, Ruth Perry Community, one 200 kVA transformer attached LV distribution cable termination housing cover has been removed and is exposed raising safety concerns.
- ✓ On the Paynesville - Gate 15 Feeder at Nimba United, one 200 kVA transformer attached LV distribution cable termination housing cover has been removed and is exposed raising safety concerns.
- ✓ On the Paynesville - Gate 15 Feeder at Nimba United in Grace Land, there is a damaged 25 kVA transformer.
- ✓ On the Paynesville - Gate 15 Feeder at the New Israel Community, Mt. Barclay, one 15 kVA transformer station is damaged. The community reported that this transformer has been damaged for over four months without replacement.
- ✓ On the Paynesville - Gate 15 Feeder, a dedicated 25 kVA transformer for God's Willing Inc. is badly leaning, the H-frame poles are rotten at the base, and the transformer nameplate is removed.

- ✓ On the Paynesville - Gate 15 Feeder, in Monoville Community (Careysburg), of several transformers inspected, one 15 kVA transformer is damaged. The Community reported that the transformer has been damage for over a year. The LV network is in a deplorable state.

Police Academy, Ruth Perry Community

(G) Metering Checklist

The followings were observed during inspections carried out:

- ✓ The Paynesville Substation has energy meters on all 66 kV and 22 kV feeders, and the Medium Voltage (21.7 kV) is found to be within the limits as defined in the Electricity Grid Code of Liberia, which makes energy accounting possible at the substation.
- ✓ Most of the distribution transformer stations visited lack energy meters.
- ✓ Damaged meter enclosures are still mounted on poles where meters have been stolen.
- ✓ There is no history of a meter audit being conducted.
- ✓ most of the meters are installed in locations that violate existing regulations and codes.

Damaged Transformer Breaker at LBS

(H) Safety Coordination

The following observations were made during the inspections:

- ✓ Assigned supervisors and field crews in the Paynesville distribution network corridors have received safety training and were observed to be well-attired in their personnel protective equipment (PPE).
- ✓ Tasks are executed without the presence of assigned safety personnel to monitor the safety-related issues. Cases of electrical shocks were confirmed by assigned LEC staffs interviewed.
- ✓ Lack of a fully functional warehouse or storage facility at the Paynesville Substation have resulted into unsafe storage of materials and equipment in the switchyard.
- ✓ Mobility for field crews remain a critical challenge as there is only one vehicle assigned to and use between three different crews for 24 hours operations.
- ✓ Detection of fire occurrence has been compromised due to the absence of fire system alarm.

Table 6.0: Summary of Paynesville Distribution Network Regulatory Compliance Score Card

No.	Inspection Index	Compliance Status				
		1	2	3	4	5
1	Documentation Checklist					X
2	Substation Checklist			X		
3	High Voltage(66kV) Network checklist			X		
4	Medium Voltage(22kV) Network Checklist			X		
5	Low voltage (0.4/0.230kV) Network Checklist				X	
6	Transformer Checklist				X	
7	Metering Checklist				X	
8	Safety Coordination			X		

***T*able 7.0: Overall Regulatory Compliance Score of Paynesville Distribution Network**

No.	Inspection Index	Compliance Status				
		1	2	3	4	5
1	**Overall Compliance**				X	

The overall Compliance status of LEC for the Paynesville distribution service areas is “non-compliant”, has a “High” risk level, is “Almost inoperable”, “poor performance “and **Urgent**-Actions are required to address the identified issues. Refer to Table 1.0 for explanatory notes on the various ratings of the scorecard and Table 2.0 for the compliance rating.

4.1.1 Limitations in Inspection

Our inspection was dependent on the available records provided by LEC. Additionally, the use of the naked eye could not verify the actual conditions of Pin Insulators, cross-arm braces, machine bolts, washers, and other network components. The use of landmark locations did not allow the team to pinpoint the exact locations where deficiencies were observed.

The findings outlined in this report were those observed only during the period of inspection in the Paynesville distribution network areas from May 9 - 16, 2025.

4.1.2 Recommendations

It is expected that LEC will work towards the attainment of full regulatory compliance in the Paynesville distribution network service areas in Montserrado County.

Below are lists of recommendations for consideration and actions:

1. The LEC is mandated to fully implement and submit to the Commission the list of documents outlined in the Inspection Manual, which are requirements in network data management.

2. The LEC is mandated to ensure compliance to license Terms and Conditions by reporting all accidents occurring within its network areas.

3. The LEC is mandated to report all accidents occurring within its network areas

4. Upon receiving this report by LEC, within 10 days, as indicated in the Inspection Manual, LEC shall provide the Commission with a detailed action plan, including schedules/timelines on how appropriate actions to correct all issues as highlighted in the punch list.

4.2 Inspection Index Findings for Gardnerville Distribution Network Corridors

(a) Documentation Checklist

The Documentation checklist is a list of documents that LEC is required to submit to the Liberia Electricity Regulatory Commission, demonstrating evidence of its documentation management system. During the inspections the following were observed:

- ✓ Documentation management at LEC is lacking.
- ✓ Absence of Network Planning Report or Network Expansion Plan.
- ✓ Absence of Inventory of Network Transformers installed.
- ✓ Absence of the number of customers or loads connected to transformers. LEC lacks supporting documentation.
- ✓ The network is deteriorating rapidly on the Gardnerville - Redlight and Gardnerville - Stockton Creek Feeders with no evidence of a Network Upgrade Plan.
- ✓ Absence of a Maintenance Plan to address existing maintenance challenges.

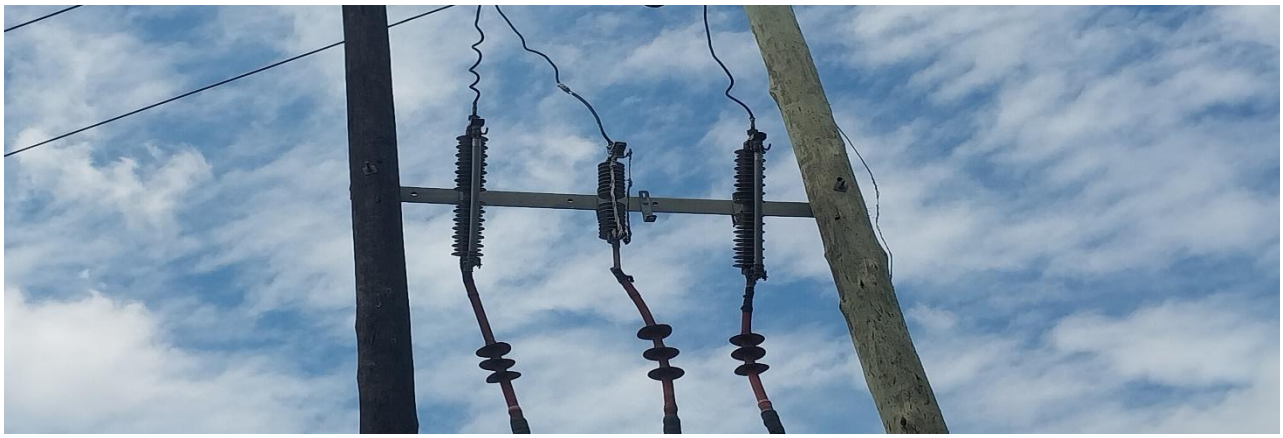
(b) Substation Checklist

Below are the reported data of the Gardnerville Substation:

The number of power transformers	**2x26 MVA**
66kV OHL Feeders	4
66kV OHL capacity per Circuit	20 MW
Outgoing 22kV feeders	4X15 MW
Substation recorded peak load	23.78 MW
Spare 22kV breaker	1
Substation Installed Capacity	40 MW

The Gardnerville Substation has two double circuits of 66 kV overhead lines (Gardnerville - Paynesville 1 & 2 and Gardnerville - Stockton Creek 1 & 2). There are four outgoing 22 kV feeders at the Gardnerville Substation: Gardnerville - Stockton Creek, Gardnerville - Redlight, Gardnerville - Johnsonville, and Gardnerville - Industrial Park.
During inspections the following were observed:

- ✓ At the Gardnerville Substation, all the equipment within the control room and switchyard are observed operational, including the spare breaker.
- ✓ The Gardnerville Substation control building and switchyards are fenced in completely. The condition of the fence is observed adequate to keep off unauthorized persons.
- ✓ The substation lacks a single line diagram of the network.
- ✓ There are no switching instructions in the substation.
- ✓ During an outage or if lines/equipment are out of service, there are absence of signages and locks to implement lock out and tag out protocols.
- ✓ On the riser termination point at the Cut-Out Fuse, one Cut-Out Fuse is bypassed, and one surge arrester is removed on the 22 kV Gardnerville - Johnsonville Feeder.
- ✓ There is a register or logbook at the Substation. However, it does not include other parameters such as the Power frequency, the power factor, and the reactive power.
- ✓ There is no fire alarm system.



Middle Phase of Cut-Out Fuse Bypassed at Gardnerville Substation

(c) <u>High Voltage (66kV) Network Checklist</u>

There are two double circuits of four 66 kV overhead lines terminated at the Gardnerville Substation. They are the Gardnerville - Paynesville lines 1 & 2 measuring 9.457 km of each and the Gardnerville - Stockton Creek lines 1 & 2 measuring 6.277 km of each line respectively. The high voltage 66 kV network is comprised of towers and monopoles carrying 150 square millimeter AAAC Cables.

The following observations were made during inspection:

- ✓ Substation are in a good state of operation, and vegetation management complies with regulatory standards.
- ✓ Along the Somalia Drive on Japan's Freeway, one tower spot has become a dump site.

Somalia Drive, Japan's Freeway

(d) Medium Voltage (MV) Network Checklist

The Gardnerville Substation has four 22 kV outgoing feeders: the Gardnerville - Redlight Feeder of length 48.187 Km, the Gardnerville - Johnsonville Feeder of length 59.652 km, the Gardnerville - Stockton Creek Feeder of length 46.995 km, and the Gardnerville - Industrial Park of length 3.780 km. The lines are strung with 120 square millimeters of AAAC cables.

The following were observed during the inspections:

- ✓ The Industrial Park Feeder is well-maintained and managed; vegetation management is compliant and the installation meets best practice.
- ✓ Apart from the Industrial Park Feeder, most of the extensions/T-Offs on the other feeders mentioned do not have cut-outs for isolation to carry out maintenance and implement safety measures as required.
- ✓ The termination of two different feeders with no distinctive signages on the same pole structures are clear safety and operational risk. At the different dead ends, specifically the Gardnerville - Stockton Creek, Stockton Creek - New Georgia, Gardnerville - Redlight, and Stockton Creek - LPRC, where two circuits dead-end back-to-back on the same pole, there are no isolators (kept in normally open position and locked) to enable switching flexibility when one line has a problem.
- ✓ On the Gardnerville - Stockton Creek 22 kV Feeder, at the Old LPRC Junction, the conductor load/tension is leaning the insulators due to poor construction practices.
- ✓ On the Gardnerville - Stockton Creek 22 kV Feeder, badly leaning MV poles and damaged MV poles were found opposite MSF, Barnesville Plank Field, Patient Shop (towards Barnesville Dry Rice Market), and Sunshine Community.
- ✓ On the Gardnerville - Redlight Feeder, there is an inappropriate long MV Span at Ab Robert Funeral Home, a low MV conductor around the New Hope Junction (Back of MVTC), and from MVTC Community to Neezoe junction, including Jacob Town Community respectively.

Leaning Cross-arm with Insulator on the Somalia Drive on Gardnerville - Stockton Creek Feeder

(e) Low Voltage network Checklist

The 0.4/0.23kV network appears to be partially maintained in some areas, and the LV is constructed using varied sizes of ABC bundled conductors. The inspection team observed the following during low voltage networks inspections:

- ✓ The Gardnerville - Johnsonville and the Gardnerville - Industrial Park are newly constructed networks.
- ✓ In the Gardnerville - Johnsonville LV Feeder most of the transformers are located on the roadside away from the load centers, and some LV poles have started falling due to improper lines stringing and longer spans.
- ✓ On the Gardnerville - Stockton Creek 22 kV Feeder, many non-compliant LV network constructions were observed in Barnesville Plank Field Community, Gardnerville Town Hall Community, James Edward Marshall UMC Community, New Georgia (U-Curve) Community, Patient Shop Community, Kardoma Community, Johnsonville Oldfield, Barnesville Kpelle Town Community, Johnsonville Pepperwood Town Community, Johnsonville Uptown (towards Thomas Fallah Resident), and Johnsonville Green Land to Mt. Barclay Communities respectively.
- ✓ On the Gardnerville - Redlight 22 kV Feeder, many non-compliant LV network constructions were observed in NTA, MVTC, St. Francis, including Chicken Farm, Jacob Town, Neezoe, Redlight, Parker Paint, Barclay Mission, Morris Farm, Bonah Farm - Kpelleh Town, and Mt. Barclay respectively.
- ✓ On the Gardnerville - Johnsonville Feeder, customers at the far end of low Voltage feeders are experiencing low voltage. Specifically in Peter Farm, Johnsonville, customers at the far end from a 300 kVA transformer installed on the main road. This is due to very long spans of LV feeders.

- ✓ On the Gardnerville - Johnsonville Feeder, some of the poles have two to three different LV feeders on them, which has undermined the mechanical resilience of the poles resulting to breakage or deformation. A particular reference can be made to the Peter Farm Community in Johnsonville.

Leaning LV Pole with Insulator at the Top of the Pole

(f) <u>Transformer Checklist</u>

- ✓ Housekeeping remains a major challenge at transformer stations in this corridor.
- ✓ On the Gardnerville - Redlight, Gardnerville - Stockton Creek Feeders, most of the transformer breaker enclosures were observed either damaged or without covers.
- ✓ It was observed that the network has a lot of damaged and abandoned transformers. For example, on the Gardnerville - Stockton Creek 22 kV Feeder, there is a 25 kVA streetlight transformer that has been disconnected for months. Damaged transformers can be located at the Old LPRC Junction, the Barnesville Junction, Dry Rice Market to Johnsonville Uptown, Kardoma, Barnesville Kpelleh Town, Johnsonville Uptown to Mt. Barclay, and Johnny Kpehe Road.

- ✓ On the Gardnerville - Redlight Feeder, several damaged transformers were also located in Chicken Farm Community, on the Main Somalia Drive, Redlight, Parker Paint Community, Morris Farm Community, and Wein Town (Camp Nou).
- ✓ On the Gardnerville - Stockton Creek 22 kV Feeder, some transformers are far from the load center, including a 500 kVA transformer at the Gardnerville Supermarket.
- ✓ Several badly leaning transformer stations were observed during the inspections. For example, On the Gardnerville - Stockton Creek 22 kV Feeder, at the Barnesville Tusa Field, there is a badly leaning 250 kVA transformer and a badly leaning 50 kVA transformer in Barnesville Kpelleh Town (Oldfield) to name a few.
- ✓ On the Gardnerville - Stockton Creek 22 kV Feeder, vandalized transformer earthing cables were observed in Lincoln Cole Community, Barnesville.
- ✓ On the Gardnerville - Redlight Feeder, almost all the transformer breaker boxes/enclosures are damaged, and some are severely burned. Poor cable termination and bypassing of breakers are factors observed.
- ✓ It was observed that due to frequent tripping of breakers at transformer stations, Community dwellers are interfering with switching operations using sticks and self-made ladders.
- ✓ Most communities have inadequate installed transformers. For example, on the Gardnerville - Redlight Feeder in the NTA Community, there is only one transformer supplying the customers/Community resulting to frequent breaker trips on account of overload or phase Voltage imbalance.
- ✓ On the Gardnerville - Johnsonville Feeder, most of the transformers are not placed into the communities or at the load centers, instead, they are installed on main roads resulting to longer spans of LV networks and frequent breaker trips on account of phase Voltage imbalance and overloads.

Burnt Transformer Pole

(G) Metering Checklist

The Gardnerville Substation has energy meters on all 66 kV and 22 kV feeders, and the Medium Voltage (21.7 kV) is found to be within the limit, which makes energy accounting possible. However, the following key issues were observed in the field:

- ✓ Metering of customers across the Gardnerville - Redlight and Gardnerville - Stockton Creek feeders is observed inadequate as most customers are connected to LEC electricity supply without meters resulting to an increasing rate of power theft.
- ✓ There is no history of a meter audit being conducted, and there is no record of the total number of meters installed per feeder.
- ✓ Most of the transformer stations visited do not have energy meters for Energy accounting.

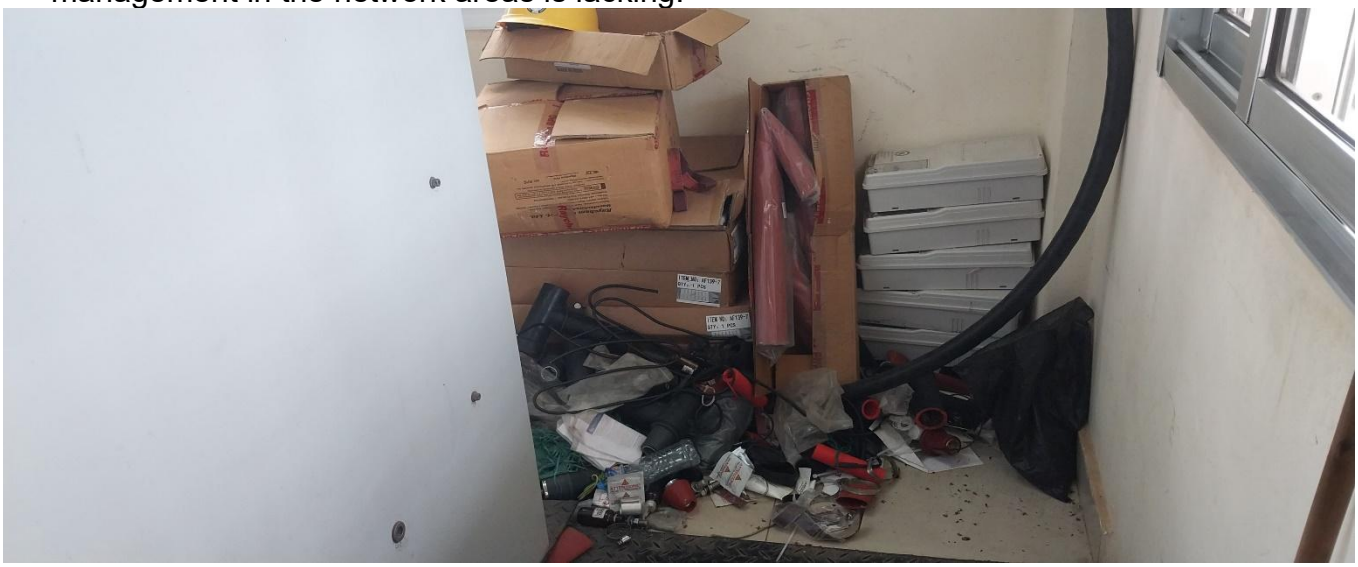
Damaged Enclosures

(H) Safety Coordination

The following safety issues were observed during inspections:

- ✓ The Gardnerville - Johnsonville Feeder is a new network; however, a few transformer stations are challenged when it comes to vegetation management. For example, in the Back Street Community in Johnsonville, Kissi Camp in Johnsonville, Peter Farm in Johnsonville, and Ni'glis Town Community.
- ✓ Water from the borehole at the Gardnerville Substation is dirty.
- ✓ Plumbing facilities in the Gardnerville Substation control building (bathroom & kitchen) and the security booth are malfunctioning.
- ✓ During rains, water enters the Gardnerville Substation control room from under both entrance and exit doors.
- ✓ Safety induction meeting is not held for visitors before entering the switchyard.
- ✓ There is no warehouse/storage facility at the Gardnerville Substation; as a result, materials are placed behind the switchgears in the substation control room.

- ✓ There is no visibility/signboard to show the assembly point.
- ✓ A first aid kit is available, but training has not been conducted for some staff members.
- ✓ Absence of safety officers on every crew performing daily tasks. The supervisors although trained in safety practices can't be performing their supervisory roles and safety roles at the same time.
- ✓ Documentation provided by the Health and Safety Department showed that the Department is making efforts to monitor and identify hazards and vegetation in the network corridors, but the implementation of corrective measures at addressing these hazards and vegetation management in the network areas is lacking.



Materials Kept at the Back of Medium Voltage Switchgear at the Gardnerville Substation

Table 8.0: Summary of Gardnerville Network Regulatory Compliance Score Card

No.	Inspection Index	Compliance Status				
		1	2	3	4	5
1	Documentation Checklist					X
2	Substation Checklist		X			
3	High Voltage(66kV) Network checklist	X				
4	Medium Voltage(22kV) Network Checklist			X		
5	Low voltage (0.4/0.230kV) Network Checklist				X	
6	Transformer Checklist				X	
7	Metering Checklist				X	
8	Safety Coordination			X		

***T*able 9.0: Overall Regulatory Compliance Score of Gardnerville Distribution Network**

No.	Inspection Index	Compliance Status				
		1	2	3	4	5
1	**Overall Compliance**			X		

The overall Compliance status of LEC for the Gardnerville distribution service areas is Compliant "Low", risk level "Medium", and is still operable with degraded performance. **Caution**-important action required to address identified issues. Refer to Table 1.0 for explanatory notes on the various ratings of the scorecard and Table 2.0 for the compliance rating.

4.2.2 Limitations in Inspection

Our inspection was dependent on the available records provided by LEC. There were other records that the LEC team couldn't provide to us, which were very crucial to our inspections. Additionally, the use of the naked eye could not verify the actual conditions of Pin Insulators, cross-arm braces, machine bolts, washers, and other network components. Additionally, the use of landmark locations did not allow the team to pinpoint the exact locations where deficiencies were observed.

The findings outlined in this report were those observed only during the period of inspection in the Gardnerville distribution network areas from May 19 - 21, 2025.

4.2.3 Recommendations

It is expected that LEC will work towards the attainment of full regulatory compliance in the Gardnerville distribution network service areas in Montserrado County.

Below are lists of recommendations for consideration and actions:

1. LEC is mandated to fully implement and submit to the Commission the list of documents outlined in the Inspection Manual, which are requirements in network data management.

2 LEC is mandated to correct and take all appropriate actions, as highlighted in the punch list, to resolve defective and damaged equipment and improve the network to serve citizens within the network zones.

3 LEC is mandated to report all accidents occurring within its network areas.

4 Upon receiving this report by LEC, within 10 days as indicated in the Inspection Manual, LEC shall provide the Commission with a detailed action plan, including schedules/timelines if the timelines on the punch list require modification.

4.3 Inspection Index Findings for Stockton Creek Distribution Network Corridors

(a) Documentation Checklist

The Documentation checklist is a list of documents that LEC is required to submit to the Liberia Electricity Regulatory Commission, demonstrating evidence of its documentation management system. During the inspections the following were observed:

- ✓ Documentation management at LEC is lacking.
- ✓ Absence of Network Planning Report or Network Expansion Plan.
- ✓ Absence of Inventory of Network Transformers installed.
- ✓ Absence of the number of customers or loads connected to transformers. LEC lacks supporting documentation.
- ✓ The network is deteriorating rapidly on the Stockton Creek-LPRC and Stockton Creek-New Georgia Feeders with no evidence of a Network Upgrade Plan.
- ✓ Absence of a Maintenance Plan to address existing maintenance challenges.

(b) Substation Checklist

Below are the reported data of the Stockton Creek Substation:

The number of power transformers	**2x13 MVA**
66kV OHL Feeders	7
66kV OHL capacity per Circuit	20 MW
Outgoing 22kV feeders	4X9 MW
Substation recorded peak load	11.2 MW
Spare 22kV breaker	1
Substation Installed Capacity	20 MW

The Stockton Creek Substation has three double circuits of 66 kV overhead lines (Stockton Creek - Bushrod lines 1 & 2, Stockton Creek - Gardnerville lines 1 & 2, and Stockton Creek - Capitol lines 1 &2) and a single circuit (Stockton Creek - Kru Town). There are four outgoing 22 kV feeders at the Stockton Creek Substation: Stockton Creek - LPRC, Stockton Creek - New Georgia, Stockton Creek-UCI, and Stockton Creek - Cemenco.

The following observations were made during inspections:

- ✓ At the Stockton Creek Substation, all the equipment is in good operational condition, including the spare breaker.
- ✓ Voltage readings are within compliance ranges.
- ✓ The tiles on the floor of the control building are damaged.
- ✓ There is leakage from the roof slab.
- ✓ There is no warehousing facility for material storage.
- ✓ The Stockton Creek substation fence is in good condition.
- ✓ The substation lacks a single line diagram of the network.
- ✓ There are no switching instructions in the substation.
- ✓ During an outage or if lines/equipment are out of service, the feeders are not locked and tagged. All padlocks were observed to be damaged.
- ✓ The feeders' panels are not labelled/named as recognized by LEC.
- ✓ The Stockton Creek Substation does not have a standby generator, and the emergency light lasts less than 30 minutes during a blackout.
- ✓ It was observed that the substation wall is cracked.
- ✓ The handheld and the base radio used for communications during operations are malfunctioning.
- ✓ Despite the substation has an emergency exit door, exiting the substation during extreme emergencies poses a challenge. The door for the Office of the Operators is located in front of the 22 kV panels/feeders. In this case, during an emergency, especially if a fire occurs on any of the 22 kV feeders' panels, an Operator in the Office may not be able to access any of the doors.
- ✓ One cut-out on the Stockton Creek - LPRC is bypassed at the Stockton Creek Substation.
- ✓ The Substation does not have a fire alarm system.
- ✓ The station service transformer is leaking oil.
- ✓ The substation has a register or logbook. However, it does not have included Power frequency, the power factor, and the reactive power as other parameters to be recorded.

Damaged Floor/Tiles in Stockton Creek Control Room

(c) High Voltage (66kV) Network Checklist

The Stockton Creek Substation has three double circuits of 66 kV overhead lines namely the Stockton Creek - Gardnerville lines 1 & 2 of 6 km each, Stockton Creek - Bushrod lines 1 &2 of 3.1 km each, and Stockton Creek - Capitol lines 1 &2 of 4.5 km each. Additionally, the Substation has a single 66kV circuit, the Stockton Creek - Kru Town of 3.8 km. The high voltage 66 kV network comprises towers and monopoles carrying 150 square millimeter AAAC cables.

During our inspection, the following were observed at the Stockton Creek:

- ✓ There is a decommissioned 66 kV tower at Stockton Creek that needs removal.

De-commissioned Tower at Stockton Creek

(d) Medium Voltage (MV) Network Checklist

The Stockton Creek Substation has four 22 kV feeders: the Stockton Creek - LPRC Feeder measuring 20.10 km, the Stockton Creek - New Georgia Feeder measuring 14.10 km, the Stockton Creek - UCI dedicated Feeder measuring 1.30 km, and the Stockton Creek - Cemenco dedicated Feeder measuring 0.96 km. The MV lines are sized at 120 square millimeters AAAC cables. The following observations were made:

- ✓ The UCI and Cemenco Feeders are well-maintained, and the installations follow best practices.
- ✓ several leaning MV poles were observed present on the Stockton Creek - LPRC and Stockton Creek - New Georgia Feeders.
- ✓ On the Cemenco Feeder, at Cow Factory, Jamaica Road, there is a leaning MV pole.
- ✓ In the Cemenco Fence, there is one burnt pole. It is also observed that a jumper cable is in close proximity to the cross-arm and a high risk of both coming into contact during strong winds.

- ✓ Cemenco dedicated transformer of 7.5 MW capacity (indoor) room is very hot due to poor ventilation.
- ✓ On the UCI Feeder in the UCI fence, de-commissioned22 kV insulated cables to a transformer that has been removed almost a year ago is almost touching the slab of the building providing safety challenges for staff performing works over the slab where the cable is located.
- ✓ The UCI Feeder, one of the cross-arm braces is loose and hanging. There is a risk of it touching the adjacent line in close proximity to it during strong winds.
- ✓ Most of the extensions/T-Offs do not have cut-offs for isolation and safety to carry out maintenance work.
- ✓ At the different dead ends, specifically the Stockton Creek - LPRC Feeder, Stockton Creek - New Georgia Feeder from the Stockton Creek Substation, where two circuits dead-end back-to-back on the same pole, there are no isolators (kept in normally open position and locked) to enable switching flexibility when one line has a problem.
- ✓ Most of the streetlights on Stockton Creek - LPRC and Stockton Creek - New Georgia Feeders are malfunctioning. Some are “ON” during the day, and others are completely damaged.
- ✓ On the Stockton Creek - LPRC Feeder, in the Cemenco Community, there is an intermediate H-frame transformer pole with incoming 22kV lines being directly tapped from MV lines to HV bushings of a 100 kVA transformer. Providing no means of isolation, one MV pole is also leaning from the T-Off towards Cemenco.
- ✓ At the United Islamic High School, there is a badly leaning pole.
- ✓ Badly Leaning MV pole at the Nexium Gas Station.
- ✓ In Toepo Village (Conneh Yard), Sackor Yard, Blackie Island, Chocolate City, and Kesselly Boulevard, there are low MV lines, and leaning transformer poles in Toepo Village (Conneh Yard).
- ✓ On the Stockton Creek - New Georgia Feeder, at Chicken Poultry, New Georgia Road, the bare MV line is very close to a building.
- ✓ At New Georgia St. Michael, leaning MV poles in Blocks B & D.
- ✓ On the Stockton Creek - LPRC Feeder and the Stockton Creek - New Georgia Feeder, there are a lot of burnt transformer poles and MV poles.
- ✓ In New Georgia Golf, there are leaning MV poles.
- ✓ A gap community Kangar Island along the Somalia Drive was identified. Some community dwellers have obtained access to illegal supplies from surrounding communities. This is a potential risk for revenue loss.
- ✓ At Battery Factory, on Silent Street, and in Darquee Town Community, there are leaning MV poles.

- ✓ Along the Somalia Drive, in the vicinity of Battery Factory junction, there is a signboard close to the MV lines and a leaning MV pole.

Leaning MV Pole from Diverted Lines from the Main Somalia Drive

(e) Low Voltage network Checklist

The 0.4/0.23 kV network is deplorable in most areas, and its construction uses various sizes of ABC bundled conductors.

The following observations were made during inspections:

- ✓ The industrial feeders are properly maintained.
- ✓ At the New Georgia Nigeria Shop (Cornelia Kruah Yard), vegetation is into the LV lines.
- ✓ Many poorly constructed LV networks with deplorable service drops, leaning LV poles, damaged LV poles were observed in the following communities: Free Port Community, Jimmy Car Road Community, Toepo Village (Conneh Yard), Sackor Yard, Battery Factory Plank Field, Blackie Island, Chocolate City, Steel Factory (Papaco), Kesselly Boulevard, Chicken Poetry, New Georgia Road, New Georgia Blocks B & D, Battery Factory (Silent Street), Darquee Town Community, New Georgia Nigeria Shop, New Georgia Golf, Iron Factory, and Doe Community.
- ✓ The LV Conductor from a 500 kVA supplying customers in the Free Port Development Community (Parco Yard) was reported to experience frequent burns.

(f) Transformer Checklist

- ✓ A few of the transformer stations are kept partially clean. However, most of the transformers installed are leaning, the breaker enclosures are burned out, and some of the transformers are damaged without replacement.
- ✓ Most transformers installed in the Stockton Creek distribution service areas are not level after installation, and the breaker enclosures are either damaged or burnt out.
- ✓ At the Chocolate City junction, vegetation is in the transformer station.
- ✓ At Battery Factory, on Silent Street, one of the jumpers on a 200 kVA transformer is cut.
- ✓ At New Georgia St. Michael in Block D, an H-frame transformer station was observed without a transformer. It was reported that the transformer got damaged and was taken for repair almost a year ago. Currently, the entire Community is supplied by one transformer, which breaker frequently trips.
- ✓ There is one de-commissioned streetlight transformer at Barnesville Junction.
- ✓ The roof of a shop is touching the base of a 100 kVA transformer opposite the Doe Community junction (Globe X Corp. LTD), and the shop extends under the transformer poles.
- ✓ At MM 2000, Jamaica Road, one of the H-frame poles at a 250 kVA transformer station on the Stockton Creek - LPRC Feeder.
- ✓ There are many damaged and de-commissioned 15 kVA pole mounted transformers, damaged poles (not in use), and de-commissioned lines in the Free Port Community and Doe Community. Additionally, towards the Doe Community Park, another 100 kVA transformer mounted on a H-frame is badly leaning.

Damaged Transformer Breaker Enclosure

(G) Metering Checklist

- ✓ The Stockton Creek Substation has energy meters on all 66 kV and 22 kV feeders, and the Medium Voltage (21.7 kV) is found to be within the limit, which makes energy accounting possible.

- ✓ In the field, there is a lot of meter theft, several homes were observed without meters, and a history of meters being removed by tenants was reported.
- ✓ There is no history of a meter audit being conducted (no documentation), and there is no record of the total number of meters installed per feeder or transformer.
- ✓ Most of the transformer stations visited have no meters.

Damaged Transformer Breaker Enclosure

(H) <u>Safety Coordination</u>

- ✓ Assigned supervisors in the Stockton Creek distribution network corridors are being trained to be safety-conscious, and staff members are well-attired in their personnel protective equipment (PPE). However, jobs are executed without safety personnel monitoring the safety-related issues. Events of electrical shocks were revealed. These incidents could be avoided if safety officers were on the ground monitoring works during executions.
- ✓ Damaged floor tiles in the control room and the Office of the Operators.
- ✓ The bathroom plumbing system is malfunctioning at the Substation.
- ✓ Lack of a warehouse or storage facility, and materials are seen littering everywhere at Stockton Creek Substation.
- ✓ There is no safety induction meeting held for visitors before entering the switchyard.
- ✓ A first aid kit is available, but training has not been conducted for some staff members.
- ✓ Absence of safety officers on every crew performing daily tasks. The supervisors although trained in safety practices can't be performing their supervisory roles and safety roles at the same time.
- ✓ Mobility remains a critical challenge as the only vehicle assigned to the field crew is used 24 hours between three different crews.

At Stockton Creek Substation

Table 10.0: Summary of Stockton Creek Network Regulatory Compliance Score Card

No.	Inspection Index	Compliance Status				
		1	2	3	4	5
1	Documentation Checklist					X
2	Substation Checklist			X		
3	High Voltage(66kV) Network checklist	X				
4	Medium Voltage(22kV) Network Checklist			X		
5	Low voltage (0.4/0.230kV) Network Checklist				X	
6	Transformer Checklist				X	
7	Metering Checklist				X	
8	Safety Coordination			X		

***T*able 11.0: Overall Regulatory Compliance Score of Stockton Creek Distribution Network**

No.	Inspection Index	Compliance Status				
		1	2	3	4	5
1	**Overall Compliance**			X		

The overall Compliance status of LEC for the Stockton Creek distribution service areas is Compliant “Low”, risk level “Medium”, and is still operable with degraded performance. **Caution-** important action required to address identified issues. Refer to Table 1.0 for explanatory notes on the various ratings of the scorecard and Table 2.0 for the compliance rating.

4.3.1 Limitations in Inspection

Our inspection was dependent on the available records provided by LEC. There were other records that the LEC team couldn't provide to us, which were very crucial to our inspections. Additionally, the use of the naked eye could not verify the actual conditions of Pin Insulators, cross-arm braces, machine bolts, washers, and other network components. Additionally, the use of landmark locations did not allow the team to pinpoint the exact locations where deficiencies were observed.

The findings outlined in this report were those observed only during the period of inspection in the Stockton Creek distribution network areas from May 22 - 23, 2025.

4.3.2 Recommendations

It is expected that LEC will work towards the attainment of full regulatory compliance in the Stockton Creek distribution network service areas in Montserrado County.

Below are lists of recommendations for consideration and actions:

1 The LEC is mandated to fully implement and submit to the Commission the list of documents outlined in the Inspection Manual, which are requirements in network data management.

2 That LEC is mandated to correct and take all appropriate actions, as highlighted in the punch list, to resolve defective and damaged equipment and improve the network to serve citizens within the network zones.

3 The LEC is mandated to report all accidents occurring within its network areas.

4 Upon receiving this report by LEC, within 10 days as indicated in the Inspection Manual, LEC shall provide the Commission with a detailed action plan, including schedules/timelines if the timelines on the punch list require modification

4.4 Inspection Index Findings for Bushrod Distribution Network Corridors

(a) Documentation Checklist

The Documentation checklist is a list of documents that LEC is required to submit to the Liberia Electricity Regulatory Commission, demonstrating evidence of its documentation management system. During the inspections the following were observed:

- ✓ Documentation management at LEC is lacking.
- ✓ Absence of Network Planning Report or Network Expansion Plan.
- ✓ Absence of Inventory of Network Transformers installed.
- ✓ Absence of the number of customers or loads connected to transformers. LEC lacks supporting documentation.
- ✓ The network is deteriorating rapidly on the Mount Coffee, Point four and Port Feeders with no evidence of a Network Upgrade Plan.
- ✓ Absence of a Maintenance Plan to address existing maintenance challenges.

(b) Substation Checklist

Below are the reported data of the Bushrod Substation:

The number of power transformers	**2x40 MVA**
66kV OHL Feeders	5
66kV OHL capacity per Circuit	36 MW
Outgoing 22kV feeders	3X12 MW
Substation recorded peak load	12.97 MW
Spare 22kV breaker	1
Substation Installed Capacity	80 MW
Peak Load on 22 kV Feeder (Any Feeder)	7 MW

The Bushrod Substation has two double circuits of 66 kV overhead lines (Bushrod - Mt. Coffee lines 1 & 2, Bushrod - Stockton Creek lines 1 & 2) and a single circuit (Bushrod - Virginia). Three

outgoing 22 kV feeders are connected at Bushrod Substation: Mount Coffee Express Feeder, Point-4 Feeder, and Port Feeder.

The following observations were made during the inspection of the Bushrod Substation:

- ✓ Most equipment at Bushrod Substation, including the spare breaker, is in good operational condition.
- ✓ voltage readings were observed within regulatory limits.
- ✓ The switchyard is unclean. Weeds have overtaken the switchyard.
- ✓ The substation lacks a single line diagram of the network.
- ✓ There are no switching instructions in the substation.
- ✓ During an outage or if lines/equipment are out of service, the feeders are not locked and tagged.
- ✓ The substation does not have a standby generator.
- ✓ The flashlight for use during black outs is not functioning properly, as it does not retain power.
- ✓ The station service transformer, Point-4, GoL 2, and the World Bank 2 breaker can only be “closed” manually instead of the push button.
- ✓ The grounding/earthing handle in the Bushrod 66 kV switchyard has been broken for months.
- ✓ The Substation does not have a fire alarm system.
- ✓ The substation has a register or logbook. However, it does not include records of the Power frequency, the power factor, and the reactive power.

Operator Office Only Open from the Outside

(c) High Voltage (66kV) Network Checklist

The Bushrod Substation has two double circuits and two single circuits terminated, namely the Bushrod - Mt. Coffee lines 1 & 2 spanning 26 km each, Bushrod - Stockton Creek lines 1 &2 of 3.1 km each, Bushrod - Virginia lines of 6.3 km, and Bushrod - Kru Town lines. The high-voltage 66 kV network comprises towers and monopoles carrying 150 square millimeter AAAC cables.

During our inspections, it was observed that apart from the Bushrod - Kru Town 66 kV line which is de-energized due to safety issues regarding a house that is directly constructed under the lines, the other 66 kV circuits are in good operating condition.

(d) Medium Voltage (MV) Network Checklist

The Bushrod Substation has three 22 kV feeders: the Mount Coffee Express Feeder spanning 60.70 Km, the Point 4 Feeder of 41.34 km, and the Port Feeder of 25.10 km. The lines are strung with 120 square millimeters AAAC cables.

The following issues were observed during the inspection:

- ✓ At Bong Mines Bridge, an ongoing line diversion is being implemented on account of a burnt MV Pole.
- ✓ There are a lot of decommissioned MV lines in Logan Town (Zone 10, Depot 2), Logan Town (Little White Chapel), Logan Town (Port Hackor Community), and Jimmy Car Road.
- ✓ Burnt T-Off pole (MV) in Logan Town, Little White Chapel.
- ✓ At SWAT, Jamaica Road, there are a few badly leaning MV Poles.
- ✓ MV lines passing in an area of the National Port Authority adjacent to an area where some LPRC tanks are located have clearance issue which is a safety concern. Additionally, there are several old poles and a leaning MV pole.
- ✓ On the Point 4 Feeder, Zuma Town Community, St. Paul Bridge, the MV lines are very close to a building undermining safety clearance.
- ✓ There is a gap between Zuma Town and LMC which is contributing to power theft in the area.
- ✓ In God Bless You Community, St. Paul Bridge, and Island Clinic, there are very low MV lines, some are at road crossings, and leaning MV poles.
- ✓ Tweah Farm, St. Mary Church, and New Kru Town have leaning MV poles and several decommissioned MV lines and poles on the Point 4 Feeder.
- ✓ On the Mt. Coffee Express, right behind Club Beer Factory around the Football Field, there is a building that was broken, but a solid concrete from the structure is left hanging on the MV pole guy. The solid concrete is pulling the pole down.

- ✓ At Macco, at the Beer Factory, the lines are close to a structure (building), and the network construction is non-compliant.
- ✓ In Caldwell, New Georgia, the network construction in non-compliant and MV poles are leaning.
- ✓ During the inspection, we observed that a fuse on one phase (middle) of a cut-out was bypassed at Caldwell on the Express Feeder.
- ✓ Caldwell, Chea Chepo Road, there is one transformer from the main road supplying the entire community; as a result, many customers are experiencing low voltage. There are a lot of rotten poles in the Communities on the Express Feeder.
- ✓ On the Express Feeder, Dixville Junction and Dixiville Road, there are low MV lines and leaning MV poles.
- ✓ There are not many isolation points, especially on T-Offs across all the feeders.
- ✓ At White Plain, the MV lines are very low, almost falling to the ground.
- ✓ There is no record of the number of meters and transformers installed per feeder.

MV Very Close to Structure

(e) Low Voltage network Checklist

The 0.4/0.23 kV network is deplorable in most areas, and its construction uses various sizes of ABC bundled conductors.

The following key issues were observed:

- ✓ Logan Town, Port Hacker, one LV circuit is running more than 900m, resulting to the far-end customers being affected by critical Low Voltage.
- ✓ In God Bless You Community, St. Paul Bridge, and Island Clinic, there are poorly maintained LV networks.
- ✓ In Caldwell, New Georgia, there is a poorly maintained LV network and broken LV poles.
- ✓ In Jennie Farm Community, there are poorly maintained LV network.

- ✓ On the Express Feeder, in Forkay Town, Green Land Community, there are poorly maintained LV network and rotten poles.
- ✓ On the Express Feeder, in Caldwell, Lajor, leaning LV poles, poorly maintained LV network, and old enclosures are still installed on poles.
- ✓ On the Express Feeder, on Benson Street, there are leaning LV poles and poorly maintained LV network.

Poor LV Network

(f) Transformer Checklist

Most of the transformer stations visited are leaning with burnt LV conductors and damaged enclosures. Additionally, the following were observed:

- ✓ There are a lot of damaged and decommissioned 15 kVA transformers in the Bushrod distribution network, which poses safety concern.
- ✓ A 315 kVA transformer in Logan Town (Zone 10, Depot 2) and several other transformer breaker enclosures are damaged, with burned pole cases.
- ✓ Badly leaning 200 kVA transformer poles at Salvation Army, Jamaica Road.
- ✓ Along the Jimmy Car Road on the Port Feeder, there is a burnt transformer pole.
- ✓ Two transformers at NAFAA have very long spans of feeders supplying customers which has led to Voltage drops being experience by customers. It was observed that some breakers on the same transformers have burnt terminals.
- ✓ In Zuma Town Community, several 15 kVA transformers are damaged and decommissioned raising safety concerns.
- ✓ In Zuma Town Community, Customer connected to a 100 kVA transformer are experiencing low voltage in some areas as reported.
- ✓ Several damaged and decommissioned 15 kVA transformers, decommissioned MV lines, and poles are seen on the Point 4 Feeder, this raises safety concern.
- ✓ At LMC, there is a badly leaning 50 kVA transformer with oil leakage.

- ✓ On the Point 4 Feeder, Port Feeder, and the Mt. Coffee Express feeder, there are a lot of damaged 25 kVA transformers, damaged or old MV lines, and rotten poles.
- ✓ During the replacement of a smaller transformer with a bigger one, adequate protection of the LV cable in not being considered during sizing resulting to the frequent burning of LV cables on account of overload.
- ✓ Tweah Farm, St. Mary Church, and New Kru Town there are damaged transformer breaker enclosures on the Point 4 Feeder.
- ✓ During the inspection, we observed leaning transformer poles, burnt or damaged breaker enclosures, New Georgia, Faith Island, on the Express Feeder.
- ✓ Jennie Farm Community, most of the transformer stations we visited have burnt enclosures, and leaning transformers on the Express Feeder.
- ✓ Most of the transformer stations we visited are not level; they start leaning from the construction stage.
- ✓ On the Express Feeder, there is one 200 kVA transformer installed at the Louisiana Market that supplies electricity to all the other nearby communities. Some customers are experiencing low voltage at the far end. The service drops, and LV cables are strung on sticks and iron poles.
- ✓ On the Express Feeder in Fofee Town, where the 200 kVA transformer supplies all the nearby communities, some customers are experiencing low voltage. A lot of customers are connected to the single-phase cables/service, and stringing is done using sticks.

Damaged Enclosures at NAFAA

(G) Metering Checklist

The Bushrod Substation has energy meters on all 66 kV and 22 kV feeders, and the Medium Voltage (21.7 kV) is found to be within the limit, which makes energy accounting possible. However, the following key issues were observed in the field:

- ✓ Metering across the Bushrod distribution network coverage area is inadequate, with an increase in power theft.

- ✓ There is no history of a meter audit being conducted (no documentation), and there is no record of the total number of meters installed per feeder.
- ✓ Most of the transformer stations visited do not have energy meters.

Burned Breaker

(H) Safety Coordination

- ✓ Assigned supervisors in the Bushrod distribution network corridors are being trained to be safety-conscious, and the staff are well-attired in their personnel protective equipment (PPE).
- ✓ Absence of relevant tools and equipment for line workers.
- ✓ The containers' control room locking facilities are all damaged.
- ✓ The Container Office for the Substation Operators is in an unclean condition. Does not lock from the inside, the chairs are broken, and the AC is not cooling properly.
- ✓ The switchyard is kept unclean (grass/vegetation).
- ✓ Bushrod Substation does not have a bathroom, even though Operators serve night shifts.
- ✓ There is no availability of water facility at Bushrod Substation.
- ✓ There is no safety induction meeting held for visitors before entering the switchyard.
- ✓ A first aid kit is available, but training has not been conducted for some staff members.
- ✓ Absence of safety officers on every crew performing daily tasks. The supervisors although trained in safety practices can't be performing their supervisory roles and safety roles at the same time.

Concrete hanging on a pole

Containerized Control Room

Table 12.0: Summary of Bushrod Network Regulatory Compliance Score Card

No.	Inspection Index	Compliance Status				
		1	2	3	4	5
1	Documentation Checklist					X
2	Substation Checklist				X	
3	High Voltage(66kV) Network checklist			X		
4	Medium Voltage(22kV) Network Checklist			X		
5	Low voltage (0.4/0.230kV) Network Checklist				X	
6	Transformer Checklist				X	
7	Metering Checklist				X	
8	Safety Coordination			X		

***T*able 13.0: Overall Regulatory Compliance Score of Bushrod Distribution Network**

No.	Inspection Index	Compliance Status				
		1	2	3	4	5
1	**Overall Compliance**				X	

The overall Compliance status of LEC for the Bushrod distribution service areas is “non-compliant”, has a “High” risk level, and is “Almost inoperable, poor performance”. **Urgent**-Actions are required to address the identified issues. Refer to Table 1.0 for explanatory notes on the various ratings of the scorecard and Table 2.0 for the compliance rating.

4.4.1.0 Limitations in Inspection

Our inspection was dependent on the available records provided by LEC. There were other records that the LEC team couldn't provide to us, which were very crucial to our inspections. Additionally, the naked eye could not verify the actual conditions of Pin Insulators, cross-arm braces, machine bolts, washers, and other network components. Additionally, the use of landmark locations did not allow the team to pinpoint the exact locations where deficiencies were observed.

The findings outlined in this report were those observed only during the period of inspection in the Bushrod distribution network areas from May 26 - 30, 2025.

4.4.2 Recommendations

It is expected that LEC will work towards the attainment of full regulatory compliance in the Bushrod distribution network service areas in Montserrado County.

Below are lists of recommendations for consideration and actions:

1 The LEC is mandated to fully implement and submit to the Commission the list of documents outlined in the Inspection Manual, which are requirements in network data management.

2 The LEC is mandated to correct and take all appropriate actions, as highlighted in the punch list, to resolve defective and damaged equipment and improve the network to serve citizens within the network zones.

3 The LEC is mandated to report all accidents occurring within its network areas.

4 Upon receiving this report by LEC, within 10 days as indicated in the Inspection Manual, LEC shall provide the Commission with a detailed action plan, including schedules/timelines if the timelines on the punch list require modification.

4.5. Inspection Index Findings for Kru Town Distribution Network Corridors

(a) Documentation

The Documentation checklist is a list of documents that LEC is required to submit to the Liberia Electricity Regulatory Commission, demonstrating evidence of its documentation management system. During the inspections the following were observed:

- ✓ Documentation management at LEC is lacking.
- ✓ Absence of Network Planning Report or Network Expansion Plan.
- ✓ Absence of Inventory of Network Transformers installed.
- ✓ Absence of the number of customers or loads connected to transformers. LEC lacks supporting documentation.
- ✓ No evidence of a Network Upgrade Plan.
- ✓ Absence of a Maintenance Plan to address existing maintenance challenges.

(b) Substation Checklist

Below are the reported data of the Kru Town Substation:

The number of power transformers	**1X20 MVA, 1X13 MVA**
66kV OHL Feeders	2
66kV OHL capacity per Circuit	MW
Number of outgoing 22kV feeders & installed capacities	4X11 MW
Substation recorded peak load	9.8 MW
Spare 22kV breaker	3
Substation Installed Capacity	26 MW
Peak Load on 22 kV Feeder (Any Feeder)	4 MW

The Kru Town Substation has two 66 kV overhead circuits (Bushrod - Kru Town lines and Stockton Creek - Kru Town lines). Four outgoing 22 kV feeders originate from the Kru Town Substation: Mamba Point Feeder, Water & City Feeder, Vai Town Feeder, and the US Embassy

Feeder. At the Kru Town Substation, equipment is in good operational condition, including the spare breakers.

The following key issues were observed:

- ✓ The substation lacks an updated single-line diagram of the network.
- ✓ There are no switching instructions in the substation.
- ✓ The substation does not have a standby generator. Additionally, the flashlight/emergency is malfunctioning.
- ✓ The Water & City riser pole is broken.
- ✓ The Substation does not have a fire alarm system.
- ✓ The substation has a register or logbook. However, it does not include records of the Power frequency, the power factor, and the reactive power.
- ✓ Absence of substation maintenance history/evidence or maintenance plan.
- ✓ There is no water for drinking.
- ✓ The walls of the control building are dirty.
- ✓ There are a lot of old desks and cubicles found in the substation.
- ✓ The fence around the power transformers and the isolators is broken.
- ✓ Damaged lights in the indoor 66 kV control room.
- ✓ Damaged old switchgear in the substation yard.
- ✓ Mosquitoes are all over in the control room, even during the day.

Old Desks and Cubicles

(c) <u>High Voltage (66kV) Network Checklist</u>

The Kru Town Substation has two circuits: the Bushrod - Kru Town measuring 6.3 km, and the Stockton Creek - Kru Town measuring 3.8 km. The high-voltage 66 kV network comprises towers and monopoles carrying 150 square millimeter AAAC cables. The Bushrod - Kru Town overhead

circuit is currently de-energized due to safe clearance in the Doe Community area, where the circuit passes over a structure.

(d) Medium Voltage (MV) Network Checklist

The Kru Town Substation has four 22 kV feeders: the Mamba Point Feeder spanning 8.30 km, the Water & City Feeder of 9.10 km, the Vai Town Feeder of 13.20 km, and the US Embassy dedicated Feeder of 1.60 km. The lines are strung using 120 square millimeters AAAC cables.
The 22 kV network at the Kru Town distribution service areas is in good operational condition. This is due to ongoing preventive maintenance activities, with the team having a clear vision of what the network should look like in the coming months and years, despite the lack of a written maintenance plan. This preventive maintenance strategy, which has kept the network in excellent condition, is worth adopting. The installation is well-secured, and despite limited resources, there is a rapid shift from wooden poles to concrete or steel poles. The alignment of poles in critical areas is good, and the pole foundations are well-constructed. Isolation points are properly maintained, cut-offs and surge arresters are well mounted, and most areas meet standard clearance requirements. The network is flexible for operation and maintenance due to the installation and isolation points along the lines. Should one feeder experience a problem, the load could be quickly switched to the nearby feeder via the remote isolators.

However, here are other issues observed during the inspection:

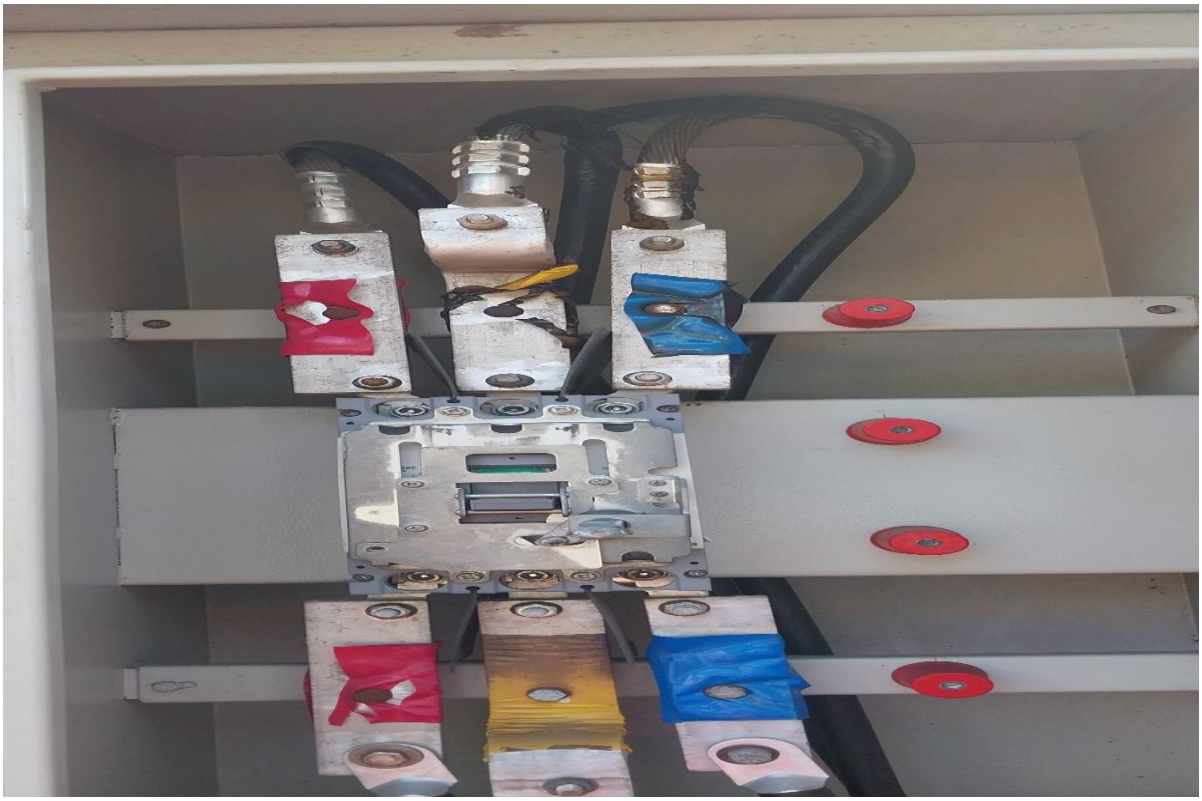
- ✓ There are a few damaged streetlights still installed on the poles; some are at the point of falling.
- ✓ Communication cables are not properly installed on LEC poles, raising safety concerns.
- ✓ Cable terminations are not properly done. For example, some of the connections are done without the use of connectors.
- ✓ At the Kru Town Substation, one of the Water & City Feeder riser poles is broken/damaged.
- ✓ There is a leaning pole at Up Town Garage.
- ✓ On Ashmun Street, Dusty Road, there are old and damaged streetlights.

(e) Low Voltage network Checklist

The 0.4/0.23 kV network is deplorable in most areas, and it's constructed using varied sizes of ABC bundled conductors. Three 22 kV feeders terminate from the Kru Town Substation: Mamba Point Feeder, the Vai Town Feeder, the Water & City Feeder, and the US Embassy Feeder, which is a dedicated feeder.

However, the following key issues were observed:

- ✓ In West Point and Clara Town, the LV cables and service drops are poorly done.
- ✓ Most of the LV cables around the Low Voltage Distribution Box are being peeled; this is across all the feeders. This is hazardous for other team members who may not know, or for children who play with and around these LVDBs.
- ✓ In West Point, Slip Way, and Clara Town, there are lots of damaged or rotten LV poles.
- ✓ Some of the LV cables used on the MCCB are of poor quality; as a result, these cables burn inside or outside the MCCB Box.



Brunt LV Cables Inside MCCB Box

(f) Transformer Checklist

Most of the transformers installed in the Kru Town distribution service areas are properly installed and leveled.

However, the following were observed:

- ✓ On the Mamba Point Feeder, there are several damaged 15 kVA and 25 kVA transformers with old MV lines that are still mounted and strung on poles. Most of those poles are rotten from the bottom. There is a history of one of the damaged 15 kVA transformers falling from the poles in West Point.
- ✓ Most people are directly connected to the network without the use of meters.

- ✓ Most of the streetlights in communities are on 24/7 on all feeders.
- ✓ There is vegetation in the French Pier Sub transformer station.
- ✓ On the Water & City Feeder at Camp Johnson and McDonald Streets intersection, there are two damaged transformers: 200 kVA and 50 kVA. On Crown Hill, there is another damaged 200 kVA.
- ✓ In Slip Way, there are several damaged and decommissioned 15 kVA transformers, decommissioned single-phase MV lines, decommissioned jumpers on the MV lines, decommissioned poles, and decommissioned meter enclosures. Additionally, some of the poles with 15 kVA are rotten.
- ✓ There is a single phasing at UBA, or one of the jumpers connecting to the 500 kVA supplying UBA is cut. Additionally, the pole is burned, and the enclosures are damaged.
- ✓ At the Cathedral Catholic High School, the transformer breaker enclosures are damaged, and one jumper is cut from the arrester.
- ✓ There is a pole-mounted 500 kVA transformer at GAC on Ashmun Street, the pole is burned from the top, and it's rotten from the bottom. The breaker enclosures are damaged.
- ✓ In Clara Town, including the Clara Town Health Center on the Vai Town Feeder, there are damaged 15 kVA transformers, decommissioned poles, decommissioned MV lines, and unmetered customers.
- ✓ On the Vai Town Feeder, at Sham Incorporated Compound in Vai Town, there is a 500 kVA dedicated transformer; the compound experiences voltage fluctuation at times as reported.
- ✓ The Low-Voltage Distribution Boxes along the coastal belt are rusting.

Damaged Transformer Breaker Enclosures

(G) Metering Checklist

The Kru Town Substation has energy meters on all 66 kV and 22 kV feeders, and the Medium Voltage is found to be within the limit, which makes energy accounting possible.

However, the following key issues were observed in the field:

- ✓ Metering across in West Point and Clara Town is inadequate; most of the people using the power are directly connected without meters to the grid on the Water & City, Mamba Point, and Vai Town Feeders.
- ✓ There is no history of a meter audit being conducted (no documentation), and there is no record of the total number of meters installed per feeder.
- ✓ Most of the pole-mounted meter enclosures are damaged on all the feeders from the Kru Town Substation.

(H) Safety Coordination

Assigned supervisors in the Kru Town distribution network corridors are being trained to be safety-conscious, and the staff are well-attired in their personnel protective equipment (PPE).

- ✓ There is no water available in the substation for drinking or preparing coffee for operators on duty.
- ✓ Mosquitoes are seen everywhere in the substation, even during the day. The control room is dirty. There are a lot of damaged and old materials in the control room, including old desks and damaged switchgear.
- ✓ Broken fence around the switchyard where the power transformers are installed.
- ✓ In the 66 kV indoor control room, most of the lights are off.
- ✓ Old or damaged switchgear is still kept in the sub-yard.
- ✓ Lack of practical application of fire extinguisher training.
- ✓ Bathroom door lock damaged.
- ✓ There is no safety induction meeting held for visitors before entering the switchyard.
- ✓ Absence of safety officers on every crew performing daily tasks. The supervisors although trained in safety practices can't be performing their supervisory roles and safety roles at the same time.

Transformer Station at French Pier Sub

Table 13.0: Summary of Kru Town Network Regulatory Compliance Score Card

No.	Inspection Index	Compliance Status				
		1	2	3	4	5
1	Documentation Checklist					X
2	Substation Checklist		X			
3	High Voltage(66kV) Network checklist		X			
4	Medium Voltage(22kV) Network Checklist	X				
5	Low voltage (0.4/0.230kV) Network Checklist		X			
6	Transformer Checklist		X			
7	Metering Checklist		X			
8	Safety Coordination			X		

***T*able 14.0: Overall Regulatory Compliance Score of Kru Town Distribution Network**

No.	Inspection Index	Compliance Status				
		1	2	3	4	5
1	**Overall Compliance**		X			

The overall compliance status of LEC for the Kru Town distribution service areas is rated as 'Compliant Medium," risk level "Low", and remains operational but with reduced performance. Noteworthy—capture this in the next inspection cycle and adjust the ranking as needed based on significant or lesser improvements. Refer to Table 1.0 for explanatory notes on the various ratings of the scorecard and Table 2.0 for the compliance rating.

4.5.1 Limitations in Inspection

Our inspection was dependent on the available records provided by LEC. There were other records that the LEC team couldn't provide to us, which were very crucial to our inspections. Additionally, the use of the naked eye could not verify the actual conditions of Pin Insulators, cross-arm braces, machine bolts, washers, and other network components. Additionally, the use of landmark locations did not allow the team to pinpoint the exact locations where deficiencies were observed.

The findings outlined in this report were those observed only during the period of inspection in the Kru Town distribution network areas from June 19 - 24, 2025.

4.5.2 Recommendations

It is expected that LEC will work towards the attainment of full regulatory compliance in the Kru Town distribution network service areas in Montserrado County.

Below are lists of recommendations for consideration and actions:

1 The LEC is mandated to fully implement and submit to the Commission the list of documents outlined in the Inspection Manual, which are requirements in network data management.

2 Thet LEC mandated to correct and take all appropriate actions to resolve the issues highlighted in the punch list. The LEC is mandated to report all accidents occurring within its network areas.

3 The LEC is mandated to report all accidents occurring within its network areas.

4 Upon receiving this report by LEC, within 10 days as indicated in the Inspection Manual, LEC shall provide the Commission with a detailed action plan, including schedules/timelines if the timelines on the punch list require modification.

4.6 Inspection Index Findings for Capitol Distribution Network Corridors

(a) Documentation Checklist

The Documentation checklist is a list of documents that LEC is required to submit to the Liberia Electricity Regulatory Commission, demonstrating evidence of its documentation management system. During the inspections the following were observed:

- ✓ Documentation management at LEC is lacking.
- ✓ Absence of Network Planning Report or Network Expansion Plan.
- ✓ Absence of Inventory of Network Transformers installed.
- ✓ Absence of the number of customers or loads connected to transformers., LEC lacks supporting documentation.
- ✓ No evidence of a Network Upgrade Plan.
- ✓ Absence of a Maintenance Plan to address existing maintenance challenges.

(b) Substation Checklist:

Below are the reported data of the Capitol Substation:

The number of power transformers	**2X13 MVA**
66kV OHL Feeders	4
66kV OHL capacity per Circuit	20 MW
Number of outgoing 22kV feeders & installed capacities	3X11 MW
Substation recorded peak load	10.4 MW
Spare 22kV breaker	7
Substation Installed Capacity	MW
Peak Load on 22 kV Feeder	9 MW

The Capitol Substation has two double circuits of 66 kV overhead lines (Stockton Creek - Capitol lines 1 & 2 and Capitol - Congo Town lines 1 & 2). Four outgoing 22 kV feeders are connected to the Capitol Substation: Capitol Kru Town, Capitol Hill, Capitol Bye Pass, and Capitol Congo

Town Feeders. The equipment at the Capitol Substation is in good operational condition, including spare breakers. The substation is tidy, and vegetation is kept low.
Additional observations made during the inspection are:

- ✓ there is a water leakage over the 22 kV switchgear in the control room.
- ✓ The substation lacks an updated single-line diagram of the network.
- ✓ There are no switching instructions in the substation.
- ✓ The substation standby generator is not in operation.
- ✓ The exit door does not open.
- ✓ The Substation does not have a fire alarm system.
- ✓ The substation has a register or logbook. However, it does not include records of the Power frequency, the power factor, and the reactive power.
- ✓ Absence of substation maintenance history/evidence or maintenance plan.

(c) <u>High Voltage (66kV) Network Checklist</u>

The Capitol Substation has four circuits, which consist of two double circuits. These include the Capitol – Congo Town lines 1 and 2, each 4.5 km long, and the Capitol-Stockton Creek lines 1 and 2, also 4.5 km long for each line. The high-voltage 66 kV network features towers carrying 150 square millimeter AAA conductors.

The following observations were made:

- ✓ On 15th Street, at ECO Hotel, 66 kV lines passing over a structure raising safety concern.
- ✓ In Wroto Town, Air Field Short Cut, structures are being constructed between the tower footings.
- ✓ On the Stockton Creek - Capitol 66 kV around Crown Hill, the underground 66 kV was stolen, and some tower members were removed/stolen.

Structure Built in Tower Footing along Airfield Short Cut

(d) Medium Voltage (MV) Network Checklist

The Capitol Substation has three 22 kV feeders: Capitol Kru Town Feeder of 10.60 km, Capitol Hill Feeder of 2.7 km, and Capitol Congo Town Feeder measuring 10.10 Km. The lines are strung using 120 square millimeters of AAAC cables.

The following were observed during the inspection:

- ✓ On the Capitol Hill Feeder, on the University of Liberia Main Campus, the construction is done using bare secondary; however, the construction is poorly done with several conductors almost touching the ground, this raises safety concern.
- ✓ At the back of the Executive Mansion, at NAO, a few MV poles are poorly constructed, decommissioned poles in the network, a leaning MV pole, and vegetation is growing along the lines.
- ✓ Poor MV construction from Bypassed to the University of Liberia Campus.
- ✓ At the old Health Ministry, there is a decommissioned transformer structure that is burnt.
- ✓ Some Isolators are bypassed in the network, for example, at the back of the Executive Mansion at a 500 kVA transformer.
- ✓ There is a low MV clearance at the road crossing in Jallah Town, and decommissioned MV poles are found in Jallah Town and Saye Town as well.

Old Transformer Structure at the old Health Ministry

(e) Low Voltage network Checklist

The 0.4/0.23 kV network is constructed using various sizes of ABC bundled conductors. In respect of major interventions made by the EU Project implemented in the Capitol Hill low voltage

network, the network still appears good and operational. However, the network must be patrolled at all times to help resolve network-related issues.

(f) Transformer Checklist

Most transformers installed in the Capitol distribution service areas are properly installed and leveled. However, the following were observed:

- ✓ Most of the streetlights in communities are on 24/7 on all feeders.
- ✓ At the Ministry of Foreign Affairs, there is a 25 kVA streetlight transformer, the pole the transformer is install on is burnt
- ✓ A few 15 kVA and 25 kVA transformers are found in the network in Buzzi Quarter, Jallah Town, Saye Town, and other places. Most of these transformers are decommissioned and damaged per information gathered but are still installed on the poles.
- ✓ Transformers around Coastal areas are rusting, for example, around the Commission on Arms. Additionally, there is a voltage fluctuation and a low voltage issue per information from customers.
- ✓ There are a lot of damaged transformer enclosures on all the feeders from Capitol Substation at MCC, the back of Executive Mansion, Sinkor, Jallah Town, Saye Town, National Disaster Management Agency, PHP, and other places.
- ✓ On Gurley Street, Beach Side, a 500 kVA transformer fence is damaged. It has become vulnerable to unauthorized persons and a safety risk.
- ✓ At the Temple of Justice, there is a dedicated transformer that is ground-mounted. During heavy rain, the water sets at the transformer, vegetation has grown in the area. The customer informed the team that the transformer does not take their entire load whenever the Supreme Court comes on. In this case, to power the Supreme court, they have to put the standby generator on.

(G) Metering Checklist

The Capitol Substation has energy meters on all 66 kV and 22 kV feeders, and the Medium Voltage is found to be within the limit, which makes energy accounting possible. The following key issues were observed in the field:

- ✓ There is no history of a meter audit being conducted (no documentation), and there is no record of the total number of meters installed per feeder.
- ✓ Most of the pole-mounted meter enclosures are damaged on all the feeders from the Capitol Substation.

(H) Safety Coordination

Assigned supervisors in the Capitol distribution network corridors are being trained to be safety conscious, and the staff are found well-attired in their personnel protective equipment (PPE). However, the following key issues were observed:

- ✓ There is a history of a damaged and decommissioned 15 kVA transformer that fell from the pole to the ground in Buzzi Quarter, and there are still many damaged and decommissioned 15 kVA & 25 kVA transformers, and decommissioned poles in the network.
- ✓ Leakage in the control room over the 22 kV switchgear.
- ✓ One of the standing ACs is damaged in the control room at the Capitol Substation.
- ✓ Substation exit door is damaged.
- ✓ Power transformer 1 bushings are damaged. Operating the substation on one transformer puts the substation at risk of collapse should there be any issue with transformer 2.
- ✓ There is no safety induction meeting held for visitors before entering the switchyard.
- ✓ Absence of safety officers on every crew performing daily tasks. The supervisors although trained in safety practices can't be performing their supervisory roles and safety roles at the same time.

Leakage Roof Slab in Control Room

Table 15.0: Summary of Capitol Network Regulatory Compliance Score Card

No.	Inspection Index	Compliance Status				
		1	2	3	4	5
1	Documentation Checklist					X
2	Substation Checklist			X		
3	High Voltage(66kV) Network checklist			X		
4	Medium Voltage(22kV) Network Checklist		X			
5	Low voltage (0.4/0.230kV) Network Checklist		X			
6	Transformer Checklist			X		
7	Metering Checklist			X		
8	Safety Coordination			X		

***T*able 16.0: Overall Regulatory Compliance Score of Capitol Distribution Network**

No.	Inspection Index	Compliance Status				
		1	2	3	4	5
1	**Overall Compliance**			X		

The overall Compliance status of LEC for the Capitol distribution service areas is Compliant "Low", risk level "Medium", and is still operable with degraded performance. **Caution-**important action required to address identified issues. Refer to Table 1.0 for explanatory notes on the various ratings of the scorecard and Table 2.0 for the compliance rating.

4.6.1 Limitations in Inspection

Our inspection was dependent on the available records provided by LEC. There were other records that the LEC team couldn't provide to us, which were very crucial to our inspections. Additionally, the naked eye could not verify the actual conditions of Pin Insulators, cross-arm braces, machine bolts, washers, and other network components. Additionally, the use of landmark locations did not allow the team to pinpoint the exact locations where deficiencies were observed.

The findings outlined in this report were those observed only during the period of inspection in the Capitol distribution network areas from June 25 - 27, 2025.

4.6.2 Recommendations

It is expected that LEC will work towards the attainment of full regulatory compliance in the Capitol distribution network service areas in Montserrado County.

Below are lists of recommendations for consideration and actions:

1. The LEC is mandated to fully implement and submit to the Commission the list of documents outlined in the Inspection Manual, which are requirements in network data management.

2. The LEC is mandated to correct and take all appropriate actions to resolve issues highlighted in the punch list.

3. The LEC is mandated to report all accidents occurring within its network areas.

4. Upon receiving this report by LEC, within 10 days as indicated in the Inspection Manual, LEC shall provide the Commission with a detailed action plan, including schedules/timelines if the timelines on the punch list require modification.

4.7 Inspection Index Findings for Congo Town Distribution Network Corridors

(a) Documentation Checklist

The Documentation checklist is a list of documents that LEC is required to submit to the Liberia Electricity Regulatory Commission, demonstrating evidence of its documentation management system. During the inspections the following were observed:

- ✓ Documentation management at LEC is lacking.
- ✓ Absence of Network Planning Report or Network Expansion Plan.
- ✓ Absence of Inventory of Network Transformers installed.
- ✓ Absence of the number of customers or loads connected to transformers., LEC lacks supporting documentation.
- ✓ The network has several construction and maintenance challenges. Absence of a Network Upgrade and Maintenance Plan.

(b) Substation Checklist

Below are the reported data of the Congo Town Substation:

The number of power transformers	**2X25 MVA**
66kV OHL Feeders	4
66kV OHL capacity per Circuit	20 MW
Number of outgoing 22kV feeders & installed capacities	4X11 MW
Substation recorded peak load	20 MW
Spare 22kV breaker	1
Substation Installed Capacity	40 MW
Peak Load on 22 kV Feeder (Congo Town Back Road)	6.4 MW

The Congo Town Substation has two double circuits of 66 kV overhead (Paynesville Congo Town lines 1&2 and Congo Town to Capitol lines 1&2). Four outgoing 22 kV feeders originate from the Congo Town Substation: Congo Town Back Road Feeder, Ministerial Complex Feeder, Congo

Town Matildi Feeder, and Congo Town JFK Feeder. At the Congo Town Substation, the equipment is in good operational condition, including the spare breakers.

The following key issues were also observed:

- ✓ The substation lacks a single line diagram of the network.
- ✓ There are no switching instructions in the substation.
- ✓ The DC supply emergency lighting system and AC supply lighting are malfunctioning.
- ✓ The fire alarm system is damaged.
- ✓ Desktop monitor for SCADA system malfunctioning.
- ✓ Handset and base radio are all damaged. Operators are using the desk phone to conduct switching.
- ✓ Damaged and decommissioned Neutral Earthing Resistor still in switchyard.
- ✓ Substation understaffed/limited manpower for the operation of the substation.
- ✓ There is a sinking concrete settlement near the station service transformer, this raises a safety concern.
- ✓ The cut-out fuses at the riser cables for all four feeders are bypassed.
- ✓ The substation has a register or logbook. However, it does not include records of the Power frequency, the power factor, and the reactive power.
- ✓ Absence of substation maintenance history/evidence or maintenance plan.

Conducting Switching with a Desk Phone

(c) <u>High Voltage (66kV) Network Checklist</u>

The Congo Town Substation has four circuits of two double circuits, and they are the Capitol – Congo Town lines 1 & 2 of 4.5 km each, and the Stockton Creek - Capitol lines 1 &2 of 4.5 km

each. The high-voltage 66 kV network comprises towers carrying 150 square millimeter AAAC cables. The inspection report of the 66 kV lines originating from the Congo Town Substation are covered under the Paynesville and Capitol Substations.

(d) Medium Voltage (MV) Network Checklist

The Congo Town Substation has four 22 kV feeders: Congo Town Backroad Feeder of 28.7 km, Congo Town Matildi Feeder of 17.7 km, Congo Town JFK Feeder spanning 7.9 km, and Congo Town Ministerial Complex Feeder of 17.7 km. The lines are strung with 120 square millimeters of AAAC cables.

The following were observed during the inspection:

- ✓ a few are leaning MV poles in Kalindo-Old Road, at the back of Cuttington Graduate School, Transformer Community-Old Road, KIA, etc.
- ✓ Some streetlights are on 24/7, while others are damaged.
- ✓ There is a leaning cross arm at Chugbor, Old Road, this raises safety concern.

(e) Low Voltage network Checklist

The 0.4/0.23 kV network is partially good in some areas, and it's constructed using various sizes of ABC bundled conductors. On account of major interventions made by the EU Project covering large rehabilitation work in the Congo Town distribution network areas, the network is good and operational. However, the network must be patrolled at all times to help resolve network-related issues.

Here are additional observations:

- ✓ Low LV in New Matidi, Kalindo-Old Road, the back of Cuttington Graduate School, Pototorie, Cabra Estate, etc.
- ✓ There are a few leaning LV poles in Kalindo-Old Road, at the back of Cuttington Graduate School, Transformer Community-Old Road, KIA, etc.
- ✓ A few decommissioned poles and rotten poles are still in the network in communities like 8th Street, from Catholic Junction to Catholic Hospital, etc.

(f) Transformer Checklist

Most transformers installed in the Congo Town distribution service areas are properly installed and leveled. However, the following were observed:

- ✓ There are lots of damaged transformer breaker enclosures in Matidi, Sinkor, Old Road, Congo Town, Lakpazee Zoo, Gbangaye Town, National Identification Registry, LACC, A.M. Dogliotti College of Medicine, Pototorie, Gaye Town, Smart Road, Chugbor, VP

Road, Cabra Estate, Pagos Island, etc., across all feeders from the Congo Town Substation.

- ✓ Leaning transformers were found in Lakpazee, Matidi, National Identification Registry, Weasay, etc.
- ✓ A few damaged and decommissioned 15 kVA transformers are still mounted/installed on the poles in communities like Matidi, Congo Town Backroad, etc.
- ✓ Transformers installed in coastal environments are rusting.
- ✓ There is an old gantry structure at Kalindo-Old Road in Transformer Community raising safety concern.
- ✓ For over two weeks, one 100 kVA transformer has been damaged in Gaye Town, Old Road.
- ✓ One LVDB is damaged in Pototorie Community.

Damaged Transformer Breaker Enclosures

(G) <u>Metering Checklist</u>

The Congo Town Substation has energy meters on all 66 kV and 22 kV feeders, and the Medium Voltage is found to be within the limit, which makes energy accounting possible. However, the following key issues were observed in the field:

- ✓ There is no history of a meter audit being conducted (no documentation), and there is no record of the total number of meters installed per feeder.
- ✓ Most of the pole-mounted meter enclosures are damaged on all the feeders from the Congo Town Substation.

(H) Safety Coordination

Assigned supervisors in the Congo Town distribution network corridors are being trained to be safety-conscious, and the staff are well-attired in their personnel protective equipment (PPE).

However, the following key issues were observed:

- ✓ Vegetation over -grown in several transformer stations: New Matidi, Dr. Dweh Clinic, New Matidi-Don Bosco, Transformer Community-Old Road, London Community, Liberty Party Headquarters-Opposite YWCA, Key Hole Community, Chugbor Community, etc.
- ✓ Most of the air conditioning systems are malfunctioning.
- ✓ No running water in the bathroom.
- ✓ The erosion has damaged the entrance of the substation at the gate, making it difficult for vehicles to enter.
- ✓ There is no safety induction meeting held for visitors before entering the switchyard.
- ✓ Absence of safety officers on every crew performing daily tasks. The supervisors although trained in safety practices can't be performing their supervisory roles and safety roles at the same time.

Entrance of Substation

Table 17.0: Summary of Congo Town Network Regulatory Compliance Score Card

No.	Inspection Index	Compliance Status				
		1	2	3	4	5
1	Documentation Checklist					X
2	Substation Checklist		X			
3	High Voltage(66kV) Network checklist	X				
4	Medium Voltage(22kV) Network Checklist		X			
5	Low voltage (0.4/0.230kV) Network Checklist		X			
6	Transformer Checklist			X		
7	Metering Checklist			X		
8	Safety Coordination			X		

***T*able 18.0: Overall Regulatory Compliance Score of Congo Town Distribution Network**

No.	Inspection Index	Compliance Status				
		1	2	3	4	5
1	**Overall Compliance**			X		

The overall Compliance status of LEC for the Congo Town distribution service areas is Compliant "Low", risk level "Medium", and is still operable with degraded performance. **Caution**-important action required to address identified issues. Refer to Table 1.0 for explanatory notes on the various ratings of the scorecard and Table 2.0 for the compliance rating.

4.7.1 Limitations in Inspection

Our inspection was dependent on the available records provided by LEC. There were other records that the LEC team couldn't provide to us, which were very crucial to our inspections. Additionally, the use of the naked eye could not verify the actual conditions of Pin Insulators, cross-arm braces, machine bolts, washers, and other network components. Also, the use of landmark locations could not allow the team to be exact with the main spots where deficiencies were observed.

The findings outlined in this report were those observed only during the period of inspection in the Congo Town distribution network areas from July 8 - 11, 2025.

4.7.2 Recommendations

It is expected that LEC will work towards the attainment of full regulatory compliance in the Congo Town distribution network service areas in Montserrado County.

Below are lists of recommendations for consideration and actions:

1 The LEC is mandated to fully implement and submit to the Commission the list of documents outlined in the Inspection Manual, which are requirements in network data management.

2 The LEC is mandated to correct and take all appropriate actions, as highlighted in the punch list, to resolve defective and damaged equipment and improve the network to serve citizens within the network zones.

3 The LEC is mandated to report all accidents occurring within its network areas.

4 Upon receiving this report by LEC, within 10 days as indicated in the Inspection Manual, LEC shall provide the Commission with a detailed action plan, including schedules/timelines if the timelines on the punch list require modification.

4.8 Inspection Index Findings for Virginia Distribution Network Corridors

(a) Documentation Checklist

The Documentation checklist is a list of documents that LEC is required to submit to the Liberia Electricity Regulatory Commission, demonstrating evidence of its documentation management system. During the inspections the following were observed:

- ✓ Documentation management at LEC is lacking.
- ✓ Absence of Network Planning Report or Network Expansion Plan.
- ✓ Absence of Inventory of Network Transformers installed.
- ✓ Absence of the number of customers or loads connected to transformers., LEC lacks supporting documentation.
- ✓ The network has several construction and maintenance challenges. Absence of a Network Upgrade and Maintenance Plan.

(b) Substation Checklist

Below are the reported data of the Virginia Substation:

The number of power transformers	1X13 MVA
66kV OHL Feeders	2
66kV OHL capacity per Circuit	20 MW
Number of outgoing 22kV feeders & installed capacities	3X11 MW
Substation recorded peak load capacity	2.3 MW
Spare 22kV breaker	1
Substation Installed Capacity	10.4 MW
Peak Load on 22 kV Feeder (Po River)	1.18 MW

The Virginia Substation has two single circuits of 66 kV overhead (Bushrod to Virginia, and Virginia to Kley). The substation is supplied from Bushrod Substation and sends power to Kley Substation. Three outgoing 22 kV feeders originate from the Virginia Substation: Virginia Po River

Feeder, Virginia Hotel Africa Feeder, and Virginia St. Paul Bridge Feeder. At the Virginia Substation, the equipment is in good operational condition, including the spare breakers.

The following key issues were observed:

- ✓ The substation lacks a single-line diagram of the network.
- ✓ There are no switching instructions in the substation.
- ✓ The DC supply emergency lighting system and AC supply lighting are all malfunctioning.
- ✓ There is no fire alarm system.
- ✓ There are no padlock and tag to implement the locked and tagged principle during maintenance works. There is no padlock for securing the equipment in the 66 kV switchgear during maintenance work.
- ✓ Station service transformer is leaking oil.
- ✓ One of the Gel batteries in the battery bank is swelling raising a safety concern.
- ✓ Some of the equipment/panel locking facilities are damaged. As a result, the panels are opened and left exposed to dust.
- ✓ Operators complained of not getting their monthly tea and water supply.
- ✓ The substation has a register or logbook. However, it does not include records of the Power frequency, the power factor, and the reactive power.
- ✓ Absence of substation maintenance history/evidence or maintenance plan.

Battery Swelling

(c) <u>High Voltage (66kV) Network Checklist</u>

The Virginia Substation has two single circuits; they are the Bushrod to Virginia lines of 5.75 km, and the Virginia to Kley lines of 37.6 km. The high-voltage 66 kV network comprises towers carrying 150 square millimeter AAA conductors. The 66 kV lines at the Virginia Substation were inspected under the Bushrod and Kley Substations.

(d) Medium Voltage (MV) Network Checklist

The Virginia Substation has three 22 kV feeders: Virginia Po River Feeder of 17.2 km, Virginia Hotel Africa Feeder of 6.20 km, and Virginia St. Paul Bridge Feeder spanning 4.80 km. The lines are strung with 120 square millimeters of AAAC cables.

The following were observed during the inspection:

- ✓ Around the Conference Center in Profile Community, the distribution transformation is installed very far for some customers; as a result, there are many customers faced with low voltage (160 V to 170 V). Because of this low voltage, many customers have removed their meters.
- ✓ There is a massive upgrade/construction of the network under the LESSAP Project; however, the existing poles (wood) and insulators are not being changed by the executing agency. Hence, the insulators and wood poles are leaning.
- ✓ At Brewerville Store, Banjor Police Station, there are badly leaning MV poles along the road.
- ✓ At the Banjor Community Clinic, the MV conductor and insulator have all changed orientation.
- ✓ At Jartu Town, there is a low MV sag.
- ✓ At Prince Avenue, there is a leaning MV and a low MV sag at Lonestar Tower, Prince Avenue.
- ✓ At Gbokon, there is an MV that was built by the Project Team over five years ago; the line has no transformer, and it has started falling on the ground.
- ✓ In Carpetville, the MV conductor that passes over homes is almost at the point of breaking.
- ✓ At the St. Paul Catholic Church, there is a low MV conductor.
- ✓ The Iron Gate extension toward Mango Town has leaning MV poles.
- ✓ During our inspection, we noticed the GA-Project execution is also leaving some gaps in some communities, which leaves the surrounding communities (homes) without power to take power through illegal means.
- ✓ There is a low MV conductor on the Sam Gibson Road or Virginia Waterside Road.

(e) Low Voltage network Checklist

The 0.4/0.23 kV network is poorly managed in some areas, and it is constructed using varied sizes of ABC bundled conductors. The following observations were made:

- ✓ At Riverside Beach, the LV conductor is strung using metal poles.
- ✓ At Ansu Soni University, the LV is strung on coconut trees.
- ✓ There is a falling bundled LV conductor along the road at God Blessing Hill.
- ✓ On Nuka Road, there is a broken LV pole.

- ✓ At the St. Paul Catholic Church, there a low LV and MV conductors.

(f) Transformer Checklist

The following were observed:

- ✓ A few transformer breakers are damaged across all three feeders.

(G) Metering Checklist

The Virginia Substation has energy meters on all 66 kV and 22 kV feeders, and the Medium Voltage is found to be within the limit, which makes energy accounting possible. However, the following key issues were observed in the field:

- ✓ There is no history of a meter audit being conducted (no documentation), and there is no record of the total number of meters installed per feeder.
- ✓ Most people are using the power without meters.

(H) Safety Coordination

Assigned supervisors in the Virginia distribution network corridors are being trained to be safety-conscious, and the staff are well-attired in their personnel protective equipment (PPE).

However, the following key issues were observed:

- ✓ Water enters the substation through the windows.
- ✓ There is no sitting facility/there are no chairs for the Operators. The Commission is told that chairs are borrowed from the community.
- ✓ The borehole/well is damaged, and there is no water in the substation. Additionally, the pump is damaged.
- ✓ The security booth's glass door is broken/damaged, and there is no chair.
- ✓ All the ACs are malfunctioning.
- ✓ Some Operators have not experienced first aid training.
- ✓ All the door handles are damaged.
- ✓ There is no safety induction meeting held for visitors before entering the switchyard.
- ✓ Absence of safety officers on every crew performing daily tasks. The supervisors although trained in safety practices can’t be performing their supervisory roles and safety roles at the same time.

Table 19: Summary of Virginia Network Regulatory Compliance Score Card

No.	Inspection Index	Compliance Status				
		1	2	3	4	5
1	Documentation Checklist					X
2	Substation Checklist			X		
3	High Voltage(66kV) Network checklist	X				
4	Medium Voltage(22kV) Network Checklist		X			
5	Low voltage (0.4/0.230kV) Network Checklist		X			
6	Transformer Checklist			X		
7	Metering Checklist			X		
8	Safety Coordination				X	

***T*able 20: Overall Regulatory Compliance Score of Virginia Distribution Network**

No.	Inspection Index	Compliance Status				
		1	2	3	4	5
1	**Overall Compliance**			X		

The overall Compliance status of LEC for the Virginia distribution service areas is Compliant "Low", risk level "Medium", and is still operable with degraded performance. **Caution-**important action required to address identified issues. Refer to Table 1.0 for explanatory notes on the various ratings of the scorecard and Table 2.0 for the compliance rating.

4.8.1 Limitations in Inspection

Our inspection was dependent on the available records provided by LEC. There were other records that the LEC team couldn't provide to us, which were very crucial to our inspections. Additionally, the use of the naked eye could not verify the actual conditions of Pin Insulators, cross-arm braces, machine bolts, washers, and other network components. Also, the use of landmark locations could not allow the team to be exact with the main spots where deficiencies were observed.

The findings outlined in this report were those observed only during the period of inspection in the Virginia distribution network areas from July 14 - 18, 2025.

4.8.2 Recommendations

It is expected that LEC will work towards the attainment of full regulatory compliance in the Virginia distribution network service areas in Montserrado County.

Below are lists of recommendations for consideration and actions:

1 The Commission mandates LEC to fully implement and submit to the Commission the list of documents outlined in the Inspection Manual, which are requirements in network data management.

2 That the Commission mandates LEC to correct and take all appropriate actions, as highlighted in the punch list, to resolve defective and damaged equipment and improve the network to serve citizens within the network zones.

3 The Commission mandates LEC to report all accidents occurring within its network areas.

4 Upon receiving this report by LEC, within 10 days as indicated in the Inspection Manual, LEC shall provide the Commission with a detailed action plan, including schedules/timelines if the timelines on the punch list require modification.

4.9 Inspection Index Findings for Mt. Coffee Substation

(a) Substation Checklist

Below are the reported data of the Mt. Coffee Substation:

The number of power transformers	4X28 kVA
66kV OHL Feeders	4
66kV OHL capacity per Circuit	80 MW
Number of outgoing 22kV feeders (Internal)	5
Substation recorded peak load capacity	54.0 MW
Spare 22kV breaker	Non
Substation Installed Capacity	89.6 MW

The Mt. Coffee Substation has two double circuits of 66 kV overhead lines (Mt. Coffee to Bushrod 1&2 and Mt. Coffee to Paynesville 1&2), and the CLSG 132 kV transmission system. Mt. Coffee Substation is a primary/transmission substation that supplies the Bushrod and Paynesville Substations. The Substation has five 22 kV feeders that are used for the internal distribution system at Mt. Coffee. The substation is currently in good operational condition.

However, the following key issues were also observed:

- ✓ Having only one person operating the substation is dangerous for their safety. During the switching exercise, the person might lose consciousness, or the staff might become unconscious, and if no one is nearby, it could lead to serious problems.
- ✓ There are a few sensors that are used for testing and monitoring of equipment; some of the indication lights for those sensors are off/damaged.
- ✓ A few Earth Switches in the switchyard have damaged or broken handles.
- ✓ There is no spare 22 kV switchgear.
- ✓ Some ventilators installed in the control building are damaged.
- ✓ There is no switching instruction in the substation.
- ✓ The substation has a register or logbook. However, it does not include records of the Power frequency, the power factor, and the reactive power.
- ✓ Absence of substation maintenance history/evidence or maintenance plan.
- ✓ The fire alarm system is damaged.

(b) Safety Coordination

- ✓ The office and kitchen in the control building are unclean and are not equipped.
- ✓ Some staff members have not gotten first aid training.
- ✓ Spare materials are not properly stored; they are exposed to the rain and sun.
- ✓ The station lacks adequate security; due to the lack of manpower, the substation operates without security on Saturdays and Sundays.
- ✓ There are no lights in the security booths at the control building and the spillway.
- ✓ Operators complained of the storage of the monthly water and tea supply.
- ✓ The Substation lacks janitorial staff; as a result, the bathroom and everywhere are unclean.
- ✓ There are lots of millipedes (thousand legs) in the control room.
- ✓ There is no light in the battery bank room.

Spare Materials at Mt. Coffee Substation

Table 21.0: Summary of Mt. Coffee Substation Regulatory Compliance Score Card

No.	Inspection Index	Compliance Status				
		1	2	3	4	5
1	Substation Checklist			X		
2	Safety Coordination			X		

***T*able 22.0: Overall Regulatory Compliance Score of Mt Coffee Substation**

No.	Inspection Index	Compliance Status				
		1	2	3	4	5
1	**Overall Compliance**			X		

The overall Compliance status of LEC for the Mt. Coffee Substation is Compliant "Low", risk level "Medium", and is still operable with degraded performance. **Caution-**important action required to address identified issues. Refer to Table 1.0 for explanatory notes on the various ratings of the scorecard and Table 2.0 for the compliance rating.

4.9.1 Limitations in Inspection

Our inspection was dependent on the available records provided by LEC. There were other records that the LEC team couldn't provide to us, which were very crucial to our inspections. Additionally, the naked eye could not verify the actual conditions of Insulators, cross-arm braces, machine bolts, washers, and other network components. Additionally, the use of landmark locations did not allow the team to pinpoint the exact locations where deficiencies were observed.

The findings outlined in this report were those observed only during the period of inspection in the Mt. Coffee Substation from July 22 - 24, 2025.

4.9.2 Recommendations

It is expected that LEC will work towards the attainment of full regulatory compliance at the Mt. Coffee Substation in Montserrado County.

Below are lists of recommendations for consideration and actions:

1 The LEC is mandated to fully implement and submit to the Commission the list of documents outlined in the Inspection Manual, which are requirements in network data management.

2 The LEC is mandated to correct and take all appropriate actions, as highlighted in the punch list, to resolve defective and damaged equipment and improve the network to serve citizens within the network zones.

3 The LEC is mandated to report all accidents occurring within its network areas.

4 Upon receiving this report by LEC, within 10 days as indicated in the Inspection Manual, LEC shall provide the Commission with a detailed action plan, including schedules/timelines if the timelines on the punch list require modification.

APPENDICES

APPENDIX A. PUNCH LIST OF DEFECTS, ACTIONS REQUIRED, AND TIMELINE FOR CURING DEFECTS IN THE PAYNESVILLE DISTRIBUTION NETWORK AREAS

No.	Location	Defect	Action Required	Completion Date
1	Paynesville Distribution Areas	In the Paynesville Distribution service areas, LEC does not know the number of distribution transformers on each feeder or the number of customers or loads connected to transformers.	Update asset registry ,customer mapping data base and carry out transformer load study.	November 15, 2025
2	Paynesville Distribution Areas	While a Network System Study is essential for real-time network planning, LEC lacks supporting documentation.	Develop and document Network system study and Planning as required by the Liberia Electricity Grid, Electricity Distribution Code of Liberia and other existing regulatory instruments.	November 15, 2025
3	Paynesville Distribution Areas	The network is deteriorating rapidly on the Paynesville Redlight and Paynesville Gate 15 Feeders due to the absence of a Network Upgrade Plan.	Develop a Network Upgrade Plan with clear timelines for continued monitoring .	November 15, 2025
4	Paynesville Distribution Areas	Although the utility performs partial maintenance on its network, it lacks a well-structured maintenance plan.	Make available a well-structured maintenance plan for both substation and the lines. Make sure these plans are kept at the substation.	November 15, 2025

5	Paynesville Distribution Network Service Areas	The Paynesville Substation has access to city water supply. However, there are no alternative source of supply or storage during nonavailability of city water supply.	Make available additional source of water supply.	By October 14, 2025
6	Paynesville Substation	The substation control building contains spare materials and debris and dilapidated materials from the field are littered everywhere in the switchyard.	• Implement a waste management mechanism to prevent littering • Provide storage facility to prevent the storing of spare materials in the control building and switch yard.	By September 15, 2025
7	Paynesville Substation	The substation lacks a single line diagram of the network.	Make available a single-line diagram for the Paynesville network.	By September 15, 2025
8	Paynesville Substation	There are no switching instructions in the substation.	Make switching instructions available.	By September 15, 2025
9	Paynesville Substation	Of the two 22 kV spare breakers, the protection unit is removed from one.	Replace the protection unit.	By November 21, 2025
10	Paynesville Substation	The Paynesville Substation does not have a fence and therefore vulnerable	Fence the entire Paynesville Substation.	By November 21, 2025

		to unauthorized access.		
11	Paynesville Substation	There are no separate offices for the Management Unit, Operations Crew, Maintenance Crew, Metering Crew, Security and Substation Operators. These staff sit around on the concrete base under the old diesel generator structure.	Improve on office provision for staff.	By November 21, 2025
12	Paynesville Substation	The security booth containerize office floor is broken and the chairs and desk are damaged.	Rehabilitate the security booth	By November 21, 2025
13	Paynesville Substation	There is one bathroom for both males and females. This is observed very inadequate for the number of staffs stationed at the substation.	Provide additional bathroom facilities to resolve this issue.	By November 21, 2025
14	Paynesville Substation	The switchyard surface area is mostly bare due to inadequate crushed rocks. The fire alarm system is disconnected.	Additional crushed rock is required. Repair or reconnect the fire alarm system.	By September 15, 2025
15	Paynesville Substation	There is a register or logbook at the Substation. However, it does not include records of other	Include all the other parameters in the logbook and improve on record keeping	September 15, 2025

		parameters such as the Power frequency, the power factor, and the reactive power. Additionally, the operators do not indicate the reasons for which the feeders are de-energized. The operators also do not indicate the specific problems causing “Earth Fault” when identified by the field crew.		
16	Paynesville Substation	Riser cables for the Paynesville - Congo Town 22 kV Feeder are not properly clamped to support structures and bare jumpers’ cables between the cut-outs and the lightning arresters are not concentric.	Correct the defects.	September 15, 2025
17	66 kV, Paynesville to Kakata	The Substation transformer blast wall is cracking, which is an identified Hazard.	Investigate for structural defect and correct.	By November 21, 2025
18	Paynesville to Congo Town 66 kV	Some bays and equipment are not labelled in the switchyard.	Label all bays and equipment.	By November 21, 2025
19	Paynesville to Schiefflin 66 kV	The outdoor lighting distribution box cover in the switchyard does not lock.	Ensure the distribution box is locked.	By November 21, 2025
20	Paynesville to Mt. Coffee 66 kV	There are several visible cracks on the civil structure of the new control building.	Investigate and resolve the civil related issues.	By November 21, 2025

17	On the Duport Road Feeder, from the Duport Road junction using the back of Cool FM, and Nimba United Community on the Paynesville Gate 15 feeder.	Vegetation management around towers is a challenge. Critical areas include riser cables on towers from Fendell to Gate 15.	Make available an executable vegetation management plan to manage vegetation. Additionally, place crushed rocks at riser cables to avoid burning of the cables.	By November 21, 2025
18	On the Duport Road Feeder, between Duport and Zubah Town Community, Zubah Town Taxi Turning Point, and Zubah Town Palm Wine Station	Most of the Paynesville - Mt. Coffee 66 kV tower foundations are being undermined by illegal soil mining activities.	Protect the tower foundations in this corridor.	By November 21, 2025
19	On all the feeders	Encroachments are being made in all the corridors, and new structures are being built under the 66 kV overhead lines. Critical areas are the Paynesville - Kakata 66 kV Feeder, in Peace Community and King Farm where people have started building very close to some towers (66 kV) and putting blocks around some. Additionally, along the Paynesville - Congo Town 66 kV, one tower footings are being used for a vehicle parking and around other towers commercial activities	by working with Public Works implement RIGHT OF WAY to resolve the problem.	By November 21, 2025

		were observed to be taking place.		
20	On the Duport Road to Congo Town Feeder at the back of Zone 5.	The 2nd circuit, Paynesville - Schiefflin 66 kV, is down/not operational due to a damaged riser cable.	Restore the 2nd circuit to improve N-1 condition.	By November 21, 2025
21	On the Paynesville - Redlight Feeder, Police Academy, Bassa Town, around the old NSA Building	On the Paynesville - Redlight Feeder, Police Academy, Bassa Town, around the old NSA Building, there is an MV pole that is almost at breaking point due to inadequate guy installation.	Investigate and improve situation.	By November 21, 2025
22	Paynesville - Gate 15	Road side network structures along Paynesville - Gate 15 remains partially in a good state of operation. However, many network structures are in a deplorable state at the back. For example, from the RITCO area towards Gate 15, badly leaning MV poles, longer spans of MV poles, inadequate sized MV poles, not properly sagged MV Conductors are among several issues observed.	Submit network maintenance plan with timelines to correct all identified defects.	September 15, 2025
23	Duport Road junction using the	Wooden poles of smaller dimensions during construction	Do a survey and map out the smaller poles and change them.	September 15, 2025

	bypass to Cool FM, Nimba United Community to name a few	were seen installed at light and heavy-angle areas. As a result, the mechanical stability and structural balance of the poles are failing. This situation is observed prevalent in places where smaller subcontractors' companies executed projects. for example, from the Duport Road junction using the bypass to Cool FM, Nimba United Community to name a few.		
24	On the Paynesville - Duport Road Feeder, between Duport and Zubah Town Community	On the Paynesville - Duport Road Feeder, between Duport and Zubah Town Community, there are several burnt poles carrying transformers and associated accessories.	Replace all burnt poles carrying transformers.	September 15, 2025
25	On the Duport Road - Congo Town Feeder at the back of Zone 5	On the Duport Road - Congo Town Feeder at the back of Zone 5, there are several leaning MV Poles structure requiring urgent attention.	Resolve the leaning pole issues.	By September 15, 2025

26	On the Paynesville - Redlight Feeder, Police Academy, down the turning point, from the main road to JK Demeh Saah School	On the Paynesville - Redlight Feeder, Police Academy, down the turning point, from the main road to JK Demeh Saah School, there are low MV lines, and erosion has undermined the MV poles on this extension.	Properly string or tension the lines, investigate causes of erosion and correct.	By September 15, 2025
27	On the Paynesville - Gate 15 Feeder at Nimba United	On the Paynesville - Gate 15 Feeder at Nimba United, the MV spans are longer, providing low clearances (Conductor to ground). MV lines are being placed on the side of the pin-type or post insulators instead of being on top of the grooves of the pin-type or post insulators. Construction works in this area is poor and noncompliant to existing guidelines.	Resolve the low clearance and correct poor construction practice.	By September 15, 2025
28	On the Paynesville - Gate 15 Feeder along the Mt. Barclay highway	On the Paynesville - Gate 15 Feeder along the Mt. Barclay highway, the Ritco dedicated transformer riser	Resolve the arcing issue on the cable.	By September 15, 2025

		cable was observed arcing.		
29	On the Paynesville - Redlight Feeder, around Bob Taylor	On the Paynesville - Redlight Feeder, around Bob Taylor fence, there is a de-commissioned monopole and a lattice tower carrying a cable. The cable is observed loosely attached and is a safety concern.	Remove the decommissioned monopole and tower.	By September 15, 2025
30	On the Paynesville - Gate 15 Feeder at Nimba United	On the Paynesville - Gate 15 Feeder at Nimba United, there is an abandoned MV network extension construction with cables lying on the ground. It was reported that this construction is illegal.	Investigate and take corrective action.	December 2, 2025
31	On the Paynesville - Gate 15 Feeder at Chinese Estate	On the Paynesville - Gate 15 Feeder at Chinese Estate, there exist several badly leaning MV and LV poles.	Resolve all leaning MV and LV poles issues in this corridor.	December 2, 2025
32	On the Paynesville - Gate 15 Feeder, in Johnson Community (Gate 15)	On the Paynesville - Gate 15 Feeder, in Johnson Community (Gate 15), in an effort to address inadequate sagging of the conductors on the T-off to the community, one of the phase conductors	Resolve the issue identified.	November 15, 2025

		is attached to a pin-insulator of a pole installed while the other two phases are left loosely sagged.		
33	On the Paynesville - Gate 15 Feeder	On the Paynesville - Gate 15 Feeder, on Wukki Farm, the network is deplorable. A broken cross-arm, badly sagged MV lines, opened transformer breaker boxes, inadequate clearances between overlapping 22 kV lines, and poor vegetation management were observed.	Resolve the identified issues ,	November 15, 2025
34	On the Paynesville - Gate 15 Feeder, at the Medical College in Fendell	On the Paynesville - Gate 15 Feeder, at the Medical College in Fendell, most of the MV poles are badly leaning.	Resolve the leaning pole issues.	November 15, 2025
35	Paynesville – Redlight and Paynesville – Gate 15	The LV is constructed using varied sizes of ABC bundled conductors inappropriately.	Make available a Network Upgrade Plan and have it executed to resolve the issue.	November 15, 2025
36	Paynesville Distribution Areas	Across all four 22 kV feeders, abandoned old enclosures are still mounted on the poles.	Remove all abandoned old enclosures from poles in the network.	November 15, 2025

37	At the back of Kool FM in the Worldwide Community	At the back of Kool FM in the Worldwide Community, there are leaning LV poles, and some are of very small dimensions.	Resolve the leaning poles and smaller pole dimensions.	November 15, 2025
38	At Duport Road Junction, at the back of Kool FM	At Duport Road Junction, at the back of Kool FM, LV is strung on coconut trees.	Investigate and correct poor construction practice.	November 15, 2025
39	Between Duport Road and Rehab Community	Between Duport Road and Rehab Community, there are several leaning LV poles.	Resolve the leaning the pole issues.	November 15, 2025
40	At Zubah Town Taxi Turning Point and Zubah Town Palm Wine Station	At Zubah Town Taxi Turning Point and Zubah Town Palm Wine Station, several LV poles are leaning. To correct these anomalies in some areas where replacement poles are installed, old poles are observed bonded to the replacement poles for support.	Resolve the leaning pole issues and remove all decommissioned poles use for support.	November 15, 2025
41	Paynesville Distribution Areas	Most of the streetlights on all feeders are operationally malfunctioning. While some were observed “ON” during the day, others are completely not operational.	Correct operational malfunctioning of street lights.	November 15, 2025

42	On the Duport Road - Congo Town Feeder at the back Zone 5	On the Duport Road - Congo Town Feeder at the back Zone 5, there are leaning LV poles, and the LV conductors are attached to palm trees for support.	Remove the conductor from palm trees and install poles.	November 15, 2025
43	On the Duport Road - Congo Town Feeder, in the GSA Road and Kissi Camp (Bhofal Chambers Road) Communities	On the Duport Road - Congo Town Feeder, in the GSA Road and Kissi Camp (Bhofal Chambers Road) Communities, low LV cables, leaning poles, and rotten poles were observed.	Resolve the low clearance and leaning pole issues.	November 15, 2025
44	On the Duport Road - Congo Town Feeder, between LBS and Lover Street	On the Duport Road - Congo Town Feeder, between LBS and Lover Street, towards the GSA Road junction, there are many rotten LV poles in that corridor.	Replace all rotten poles in the identified zone.	November 15, 2025
45	The Paynesville - Redlight Feeder	The Paynesville - Redlight Feeder is in deplorable state; physical inspection shows that the network is old and most materials such as wooden poles, conductors, guys, etc. require urgent attention.	Investigate and submit with timelines of work execution a Network Upgrade/Maintenance Plan.	September 15, 2025
46	Paynesville - Redlight Feeder at the Vogar Mission	Paynesville - Redlight Feeder at the Vogar Mission, beginning from Paynesville Town Hall area, shows that most of the LV poles are rotten and leaning,	Investigate and provide a maintenance Plan with clear timelines for works execution to resolve the rotten poles, leaning pole,	September 15, 2025

		leading to low sagged LV cables.	and low sagged by erecting new poles.	
47	Paynesville - Redlight Feeder around the Tubman Methodist School	Paynesville - Redlight Feeder around the Tubman Methodist School, there are many old and abandoned poles.	Remove those old poles from the network.	November 15, 2025
48	Paynesville - Redlight Feeder, 72nd New Eye Sight, and Bob Taylor communities	Paynesville - Redlight Feeder, 72nd New Eye Sight, and Bob Taylor communities to name a few, it was observed that LV networks are in very deplorable structural states.	Rehabilitate the entire network on this feeder. Begin by making a Network Upgrade Plan and have it executed.	November 15, 2025
49	On the Paynesville - Gate 15 Feeder at Nimba United	On the Paynesville - Gate 15 Feeder at Nimba United, there are low LV cables, burnt LV poles, and LV lines strung on wooden sticks and iron pipes.	Resolve all the low clearance, burnt poles, and cables on sticks in the network.	November 15, 2025
50	On the Paynesville - Gate 15 Feeder, from Cooper Farm junction to Gbelee Town	On the Paynesville - Gate 15 Feeder, from Cooper Farm junction to Gbelee Town, the LV from the 200 kVA transformer to the LV dead-end is more than 900m on one phase of the circuit.	Conduct network reinforcement measures.	November 15, 2025
51	Paynesville Distribution Network	Proper and consistent housekeeping remains a challenge. While some of the transformer stations are kept clean, others are very challenged with vegetation and	Submit an executable vegetation management plan and begin cleaning all transformer stations in the network.	November 15, 2025

		missing breaker enclosure covers.		
52	Outland Community (St. Kizito Catholic School)	A 200 kVA transformer around Redlight is leaking oil in the Outland Community (St. Kizito Catholic School).	Resolve the leakage issue identified.	November 15, 2025
53	In Soul Clinic, particularly Kamah Town, New Guinea, Last Turning Point (AKA School)	In Soul Clinic, particularly Kamah Town, New Guinea, Last Turning Point (AKA School), Several transformers' grounding systems are vandalized. very low LV conductors were observed. Among the several transformer stations visited, one 15 kVA transformer station in Kamah Town was damaged. It was reported by the Community that the damaged transformer has been there for over two years.	Replace transformer and restore grounding.	November 15, 2025
54	On the Duport Road - Congo Town Feeder, LBS Community (Lover Street)	On the Duport Road - Congo Town Feeder, LBS Community (Lover Street), there is a damaged 50 kVA transformer.	Restore power supply to all affected customers.	November 15, 2025
55	On the Duport Road - Congo Town Feeder, in the LBS Community around PYJ Church	On the Duport Road - Congo Town Feeder, in the LBS Community around PYJ Church, vegetation has over taken the transformer station.	submit an executable vegetation management plan and clear all vegetation from transformer stations.	November 15, 2025

56	On the Duport Road - Congo Town Feeder, Rock Hill Community	On the Duport Road - Congo Town Feeder, Rock Hill Community, there is a damaged 25 kVA transformer.	Replace where necessary all damaged transformer.	November 15, 2025
57	Paynesville - Redlight Feeder at Vogar Mission	Paynesville - Redlight Feeder at Vogar Mission (around the football field), there is a 250 kVA transformer that is leaning.	Resolve leaning transformer case identified.	November 15, 2025
58	Paynesville - Redlight Feeder at the Police Academy Watch Tower	Paynesville - Redlight Feeder at the Police Academy Watch Tower, there is a burnt H-framed transformer pole.	Replace burnt H-framed transformer pole .	November 15, 2025
59	Paynesville - Redlight Feeder, Police Academy, Ruth Perry Community	Paynesville - Redlight Feeder, Police Academy, Ruth Perry Community, one 200 kVA transformer attached LV distribution cable termination housing cover has been removed and is exposed raising safety concerns.	Resolve open housing of transformer cover identified.	November 15, 2025

60	On the Paynesville - Gate 15 Feeder at Nimba United	On the Paynesville - Gate 15 Feeder at Nimba United, one 200 kVA transformer attached LV distribution cable termination housing cover has been removed and is exposed raising safety concerns.	Resolve open housing of transformer cover identified.	November 15, 2025
61	On the Paynesville - Gate 15 Feeder at Nimba United in Grace Land	On the Paynesville - Gate 15 Feeder at Nimba United in Grace Land, there is a damaged and decommissioned 25 kVA transformer.	Remove and replace damaged and decommissioned transformer from the network	November 15, 2025
62	On the Paynesville - Gate 15 Feeder at the New Israel Community, Mt. Barclay	On the Paynesville - Gate 15 Feeder at the New Israel Community, Mt. Barclay, one 15 kVA transformer station is damaged. The community reported that this transformer has been damaged for over four months without replacement.	Remove and replace damaged and decommissioned transformer from the network	November 15, 2025
63	On the Paynesville - Gate 15 Feeder	On the Paynesville - Gate 15 Feeder, a dedicated 25 kVA transformer for God's Willing Inc. is badly leaning, the H-frame poles are rotten at the base, and the transformer	Replace the H-frame poles.	November 15, 2025

		nameplate is removed.		
64	On the Paynesville - Gate 15 Feeder, in Monoville Community (Careysburg)	On the Paynesville - Gate 15 Feeder, in Monoville Community (Careysburg), of several transformers inspected, one 15 kVA transformer is damaged. The Community reported that the transformer has been damage for over a year. The LV network is in a deplorable state.	Remove and replace damaged and decommissioned transformer from the network	November 15, 2025
65	Paynesville Distribution Network	Most of the distribution transformer stations visited lack energy meters.	Ensure energy meters are available on each transformer.	November 15, 2025
66	Paynesville Distribution Network	Damaged meter enclosures are still mounted on poles where meters have been stolen.	Remove all pole mounted damaged enclosures from the network.	November 15, 2025
67	Paynesville Distribution Network	There is no history of a meter audit being conducted.	Conduct meter audit of customers.	November 15, 2025
68	Paynesville Distribution Network	Most of the meters are installed in locations that violate existing regulations and codes.	Adhere to regulations.	November 15, 2025
69	Paynesville Distribution Network	Tasks are executed without the presence of assigned safety personnel to monitor the safety-related issues. Cases of	Ensure safety officers are assigned on field crews.	November 15, 2025

		electrical shocks were confirmed by assigned LEC staff members interviewed.		
70	Paynesville Substation	Lack of a fully functional warehouse or storage facility at the Paynesville Substation have resulted into unsafe storage of materials and equipment in the switchyard.	Relocate all materials from switch yard and implement proper storage options.	November 15, 2025
71	Paynesville Substation	Mobility for field crews remain a critical challenge as there is only one vehicle assigned to and use between three different crews for 24 hours operations.	Ensure vehicles are available for field crews.	November 15, 2025
72	Paynesville Substation	Detection of fire occurrence has been compromised due to the absence of fire system alarm.	Ensure the fire alarm system is functional.	November 15, 2025

APPENDIX B. Pictorials from the Paynesville Distribution Network Areas

Leaning LV Pole

Paynesville to Congo Town 66 kV

Wulki Farm

Paynesville

APPENDIX C. PUNCH LIST OF DEFECTS, ACTIONS REQUIRED, AND TIMELINE FOR CURING DEFECTS IN THE GARDNERVILLE DISTRIBUTION NETWORK AREAS

No.	Location	Defect	Action Required	Completion Date
1	Gardnerville Distribution Network	Documentation management at LEC is lacking.	In line with the Inspection Manual, make all documents available.	By October 14, 2025
2	Gardnerville Distribution	Absence of Network Planning Report or Network Expansion Plan.	Make available Network Planning Report or Network Expansion Plan.	By September 15, 2025
3	Gardnerville Distribution	Absence of Inventory of Network Transformers installed.	Make available distribution transformer inventory.	By September 15, 2025
4	Gardnerville Distribution Network	Absence of the number of customers or loads connected to transformers. LEC lacks supporting documentation.	Ensure meter and transformer audits are done.	By September 15, 2025
5	Gardnerville - Redlight and Gardnerville - Stockton Creek	The network is deteriorating rapidly on the Gardnerville - Redlight and Gardnerville - Stockton Creek Feeders with no evidence of a Network Upgrade Plan.	Submit an executable Network Upgrade Plan for implementation for the Gardnerville – Redlight and Gardnerville – Stockton Creek feeders.	By September 15, 2025
6	Gardnerville Substation	Absence of a Maintenance Plan to address existing maintenance challenges.	Submit a Maintenance Plan.	By September 15, 2025
7	Gardnerville Substation	The substation lacks a single line diagram of the network.	Provide a single-line diagram (SLD) for the Gardnerville network configuration.	By November 21, 2025

8	Gardnerville Substation	Lack of fire extinguisher usage training for some staff members.	Conduct fire extinguisher usage training for staff.	By November 21, 2025
9	Gardnerville Substation	During an outage or if lines/equipment are out of service, there are absence of signages and locks to implement lock out and tag out protocols.	Ensure lock out and tag out protocols are available.	September 15, 2025
10	Gardnerville Substation	On the riser termination point at the Cut-Out Fuse, one Cut-Out Fuse is bypassed, and one surge arrester is removed on the 22 kV Gardnerville - Johnsonville Feeder.	Replace the cut-out fuse.	September 15, 2025
11	Gardnerville Substation	There is a register or logbook at the Substation. However, it does not include other parameters such as the Power frequency, the power factor, and the reactive power.	Ensure the other parameters are recorded.	By November 21, 2025
12	Gardnerville Substation	There is no fire alarm system.	Ensure fire alarm system is put in place.	By November 21, 2025
13	Along the Somalia Drive on Japan's Freeway	Along the Somalia Drive on Japan's Freeway, one tower spot has become a dump site.	Remove the dirt and protect the tower to avoid dumping of dirt.	September 15, 2025
14	On the Gardnerville - Stockton Creek 22 kV Feeder	On the Gardnerville - Stockton Creek 22 kV Feeder, badly leaning MV poles and damaged MV poles	Resolve the badly leaning MV poles.	By November 21, 2025

		were found opposite MSF, Barnesville Plank Field, Patient Shop (towards Barnesville Dry Rice Market), and Sunshine Community.		
17	Gardnerville - Stockton Creek, Stockton Creek - New Georgia, Gardnerville - Redlight, and Stockton Creek - LPRC	The termination of two different feeders with no distinctive signages on the same pole structures are clear safety and operational risk. At the different dead ends, specifically the Gardnerville - Stockton Creek, Stockton Creek - New Georgia, Gardnerville - Redlight, and Stockton Creek - LPRC, where two circuits dead-end back-to-back on the same pole, there are no isolators (kept in normally open position and locked) to enable switching flexibility when one line has a problem.	Install isolation points on these dead-end poles where two circuits meet back-to-back.	By November 21, 2025
18	On the Gardnerville - Stockton Creek Feeder	On the Gardnerville - Stockton Creek 22 kV Feeder, at the Old LPRC Junction, the conductor load/tension is leaning the insulators due to poor construction practices.	Properly install the insulators and string the lines properly.	By November 21, 2025
19	Gardnerville - Johnsonville Feeder, Gardnerville – Redlight,	Apart from the Industrial Park Feeder, most of the extensions/T-Offs on the other feeders mentioned do not	Isolation points must be at all T-off for network flexibility and safety during maintenance.	By November 21, 2025

	Gardnerville – Stockton Creek	have cut-outs for isolation to carry out maintenance and implement safety measures as required.		
20	On the Gardnerville - Redlight Feeder	On the Gardnerville - Redlight Feeder, there is an inappropriate long MV Span at Ab Robert Funeral Home, a low MV conductor around the New Hope Junction (Back of MVTC), and from MVTC Community to Neezoe junction, including Jacob Town Community respectively.	Resolve clearance issues.	By November 21, 2025
21	On the Gardnerville - Johnsonville Feeder	On the Gardnerville - Johnsonville Feeder, some of the poles have two to three different LV feeders on them, which has undermined the mechanical resilience of the poles resulting to breakage or deformation. A particular reference can be made to the Peter Farm Community in Johnsonville	Do a complete survey in this area and reduce the tension on the poles.	By November 21, 2025

22	Gardnerville - Redlight, Gardnerville - Johnsonville, and Gardnerville - Stockton Creek	Housekeeping remains a major challenge at transformer stations in this corridor.	Ensure transformer stations are kept clean.	September 15, 2025
23	Gardnerville - Johnsonville	In the Gardnerville - Johnsonville LV Feeder most of the transformers are located on the roadside away from the load centers, and some LV poles have started falling due to improper lines stringing and longer spans.	Extend the MV lines into the communities and place the transformers at the load centers.	September 15, 2025
24	Gardnerville to Stockton Creek 22 kV Feeder	On the Gardnerville - Stockton Creek 22 kV Feeder, many non-compliant LV network constructions were observed in Barnesville Plank Field Community, Gardnerville Town Hall Community, James Edward Marshall UMC Community, New Georgia (U-Curve) Community, Patient Shop Community, Kardoma Community, Johnsonville Oldfield, Barnesville Kpelle Town Community, Johnsonville Pepperwood Town Community, Johnsonville Uptown (towards Thomas Fallah Resident), and	Resolve the network related deficiencies in these communities.	September 15, 2025

		Johnsonville Green Land to Mt. Barclay Communities respectively.		
25	On the Gardnerville - Redlight	On the Gardnerville - Redlight 22 kV Feeder, many non-compliant LV network constructions were observed in NTA, MVTC, St. Francis, including Chicken Farm, Jacob Town, Neezoe, Redlight, Parker Paint, Barclay Mission, Morris Farm, Bonah Farm - Kpelleh Town, and Mt. Barclay respectively.	Resolve the network related deficiencies in these communities.	By September 15, 2025
26	On the Gardnerville - Johnsonville Feeder	On the Gardnerville - Johnsonville Feeder, customers at the far end of low Voltage feeders are experiencing low voltage. Specifically in Peter Farm, Johnsonville, customers at the far end from a 300 kVA transformer installed on the main road. This is due to very long spans of LV feeders	Extend the MV lines into the communities and place the transformers at the load centers.	By September 15, 2025
27	Gardnerville - Redlight Feeder, Gardnerville - Stockton	It was observed that the network has a lot of damaged and abandoned transformers. For example, on the	Restore power to customers in these areas. Remove the 25 kVA streetlight transformer.	By September 15, 2025

		Gardnerville - Stockton Creek 22 kV Feeder, there is a 25 kVA streetlight transformer that has been disconnected for months. Damaged transformers can be located at the Old LPRC Junction, the Barnesville Junction, Dry Rice Market to Johnsonville Uptown, Kardoma, Barnesville Kpelleh Town, Johnsonville Uptown to Mt. Barclay, and Johnny Kpehe Road.		
28	Gardnerville to Redlight Feeder and Gardnerville Stockton Creek	On the Gardnerville - Redlight, Gardnerville - Stockton Creek Feeders, most of the transformer breaker enclosures were observed either damaged or without covers.	Use the appropriate breaker or the appropriate Low Voltage Distribution Box or MCCB.	By September 15, 2025
29	Gardnerville to Redlight Feeder in the NTA Community	Most communities have inadequate installed transformers. For example, on the Gardnerville - Redlight Feeder in the NTA Community, there is only one transformer supplying the customers/Community resulting to frequent breaker trips on account of overload or	Add a new transformer to share the load in the NTA Community.	By September 15, 2025

		phase Voltage imbalance.		
30	On the Gardnerville - Redlight Feeder	On the Gardnerville - Redlight Feeder, several damaged transformers were also located in Chicken Farm Community, on the Main Somalia Drive, Redlight, Parker Paint Community, Morris Farm Community, and Wein Town (Camp Nou).	Restore power to customers.	By November 21, 2025
31	On the Gardnerville - Stockton Creek	On the Gardnerville - Stockton Creek 22 kV Feeder, some transformers are far from the load center, including a 500 kVA transformer at the Gardnerville Supermarket.	Ensure transformers are placed at the load centers including the 500 kVA transformer at the Gardnerville Supermarket.	By November 21, 2025
32	Gardnerville - Stockton Creek 22 kV Feeder	Several badly leaning transformer stations were observed during the inspections. For example, On the Gardnerville - Stockton Creek 22 kV Feeder, at the Barnesville Tusa Field, there is a badly leaning 250 kVA transformer and a badly leaning 50 kVA transformer in Barnesville Kpelleh Town (Oldfield) to name a few.	Resolve the leaning H-frame transformer pole issue.	By November 21, 2025

33	Gardnerville Distribution Areas	There is no record of a meter audit being conducted, and there is no record of the total number of meters installed per feeder.	Conduct meter audit.	By November 21, 2025
34	Gardnerville to Johnsonville Feeder	The Gardnerville to Johnsonville Feeder is a new network; however, a few transformers need vegetation clearing on the Back Street Community in Johnsonville, Kissi Camp in Johnsonville, Peter Farm in Johnsonville, Ni'glis Town Community, and other places	Clear vegetation at transformer stations.	September 15, 2025
35	On the Gardnerville - Stockton Creek 22 kV Feeder	On the Gardnerville - Stockton Creek 22 kV Feeder, vandalized transformer earthing cables were observed in Lincoln Cole Community, Barnesville.	Resolve the Problem	September 15, 2025
36	On the Gardnerville - Redlight Feeder	On the Gardnerville - Redlight Feeder, almost all the transformer breaker boxes/enclosures are damaged, and some are severely burned. Poor cable termination and bypassing of breakers are factors observed.	Replace all the damaged transformer breaker enclosures.	September 15, 2025

37	Gardnerville Distribution Network	It was observed that due to frequent tripping of breakers at transformer stations, Community dwellers are interfering with switching operations using sticks and self-made ladders.	Do a load analysis and resolve the burning of breakers.	
38	On the Gardnerville - Johnsonville Feeder	On the Gardnerville - Johnsonville Feeder, most of the transformers are not placed into the communities or at the load centers, instead, they are installed on main roads resulting to longer spans of LV networks and frequent breaker trips on account of phase Voltage imbalance and overloads.	Place the transformers at load centers.	
39	Gardnerville - Redlight and Gardnerville - Stockton Creek feeders	Metering of customers across the Gardnerville - Redlight and Gardnerville - Stockton Creek feeders is observed inadequate as most customers are connected to LEC electricity supply without meters resulting to an increasing rate of power theft.	Make available meters for unmetered power users.	

40	Gardnerville Distribution Network	There is no history of a meter audit being conducted, and there is no record of the total number of meters installed per feeder.	Conduct meter audit.	September 15, 2025
41	Gardnerville Distribution Network	Most of the transformer stations visited do not have energy meters for Energy accounting.	Make available energy meters for every transformer.	September 15, 2025
42	Garnerville Distribution Areas	Safety induction meeting is not held for visitors before entering the switchyard.	Ensure safety induction meeting is conducted before entering the switchyard.	November 21, 2025
43	Garnerville Distribution Areas	The Gardnerville - Johnsonville Feeder is a new network; however, a few transformer stations are challenged when it comes to vegetation management. For example, in the Back Street Community in Johnsonville, Kissi Camp in Johnsonville, Peter Farm in Johnsonville, and Ni'glis Town Community.	Support the crews by providing them with the required materials, including vehicles.	November 21, 2025
44	Gardnerville Substation	Water from the borehole at the Gardnerville Substation is dirty.	Ensure the water is kept clean.	November 21, 2025

45	Gardnerville Substation control building	Plumbing facilities in the Gardnerville Substation control building (bathroom & kitchen) and the security booth are malfunctioning	Rectify plumbing facilities.	November 21, 2025
46	Gardnerville Substation control building	During rains, water enters the Gardnerville Substation control room from under both entrance and exit doors.	Resolve the issue	November 21, 2025
47	Gardnerville Distribution Network	Documentation provided by the Health and Safety Department showed that the Department is making efforts to monitor and identify hazards and vegetation in the network corridors, but the implementation of corrective measures at addressing these hazards and vegetation management in the network areas is lacking.	Ensure vegetation management is done.	November 21, 2025
48	Gardnerville Substation	There is no warehouse/storage facility at the Gardnerville Substation; as a result, materials are placed behind the switchgears in the substation control room.	Relocate all materials from switch yard and implement proper storage options.	November 21, 2025

49	Gardnerville Substation	There is no visibility/signboard to show the assembly point.	Put in place a signboard to indicate the assembly point.	November 21, 2025
50	Gardnerville Substation	A first aid kit is available, but training has not been conducted for some staff members.	Provide training for all Substation Operators.	November 21, 2025
51	Gardnerville Distribution Areas	Absence of safety officers on every crew performing daily tasks. The supervisors although trained in safety practices can't be performing their supervisory roles and safety roles at the same time.	Ensure safety officers are on every field crew performing task.	November 21, 2025

APPENDIX D. Pictorials for the Gardnerville Distribution Network Areas

Damaged Transformer Breaker Enclosures

Badly Leaning Transformer with Damaged Transformer Breaker Enclosures

APPENDIX E. PUNCH LIST OF DEFECTS, ACTIONS REQUIRED, AND TIMELINE FOR CURING DEFECTS IN THE STOCKTON CREEK DISTRIBUTION NETWORK AREAS

No.	Location	Defect	Action Required	Completion Date
1	Stockton Creek Substation	Documentation management at LEC is lacking.	In line with the Inspection Manual, make all documents available.	By October 14, 2025
2	Stockton Creek Distribution Areas	Absence of Network Planning Report or Network Expansion Plan.	Make available Network Planning Report.	By October 14, 2025
3	Stockton Creek Distribution Areas	Absence of Inventory of Network Transformers installed.	Conduct Inventory on Distribution Transformers installed in the Network.	By October 14, 2025
4	Stockton Creek Distribution Areas	The network is deteriorating rapidly on the Stockton Creek-LPRC and Stockton Creek-New Georgia Feeders with no evidence of a Network Upgrade Plan.	Make available Network Upgrade Plan and have it executed.	By October 14, 2025
5	Stockton Creek Substation	Absence of a Maintenance Plan to address existing maintenance challenges.	Develop a Maintenance Plan.	By October 14, 2025
6	Stockton Creek Substation	Despite the substation has an emergency exit door, exiting the substation during extreme emergencies poses a challenge. The door for the Office of the Operators is	Make available alternative route for emergency.	By September 15, 2025

		located in front of the 22 kV panels/feeders. In this case, during an emergency, especially if a fire occurs on any of the 22 kV feeders' panels, an Operator in the Office may not be able to access any of the doors.		
7	Stockton Creek Substation	There is leakage from the roof slab.	Ensure leakage is resolve from the roof slab.	By September 15, 2025
8	Stockton Creek Substation	There is no warehousing facility for material storage.	Relocate all materials from switch yard and implement proper storage options	By September 15, 2025
9	Stockton Creek Substation	Land seen outside the Substation fence at the entry of the substation.	Completely fence the entire land of the substation.	By September 15, 2025
10	Stockton Creek Substation	The substation lacks a single line diagram of the network	Ensure a single line diagram of the network in available in the Substation.	By November 21, 2025
11	Stockton Creek Substation	There are no switching instructions in the substation.	Ensure switching instructions are available.	By November 21, 2025
12	Stockton Creek Substation	During an outage or if lines/equipment are out of service, the feeders are not locked and tagged. All padlocks were observed to be damaged.	Institute a locked and tagged protocol.	By November 21, 2025
13	Stockton Creek Substation	The feeders' panels are not labelled/named as recognized by LEC.	Ensure all feeders' panels are labelled/named.	By September 15, 2025

14	Stockton Creek Substation	The Stockton Creek Substation does not have a standby generator, and the emergency light lasts less than 30 minutes during a blackout.	Make use of the DC system and solar PV to keep the Substation lighted.	September 15, 2025
15	Stockton Creek Substation	It was observed that the substation wall is cracked.	Repair crack.	September 15, 2025
16	Stockton Creek Substation	The handheld and the base radio used for communications during operations are malfunctioning.	Ensure communication system is available at the Substation.	By November 21, 2025
17	Stockton Creek Substation	One cut-out on the Stockton Creek - LPRC is bypassed at the Stockton Creek Substation.	Replace the cut-out.	By November 21, 2025
18	Stockton Creek Substation	The Substation does not have a fire alarm system.	Ensure fire alarm system is restore at Stockton Creek Substation.	September 15, 2025
19	Stockton Creek Substation	The station service transformer is leaking oil.	Repair the leakage transformer.	By November 21, 2025
20	Stockton Creek Substation	The substation has a register or logbook. However, it does not have included Power frequency, the power factor, and the reactive power as other parameters to be recorded.	Ensure the other data are recorded in the log book.	By November 21, 2025
21	Stockton Creek	There is a decommissioned 66 kV tower at Stockton Creek that needs removal.	Removal the decommissioned 66 kV tower.	By November 21, 2025

22	Stockton Creek Substation	The UCI Feeder, one of the cross-arm braces is loose and hanging. There is a risk of it touching the adjacent line in close proximity to it during strong winds.	Install the brace properly.	By November 21, 2025
23	Stockton Creek Distribution Network	Several leaning MV poles were observed present on the Stockton Creek - LPRC and Stockton Creek - New Georgia Feeders	Resolve the leaning poles in this corridor.	By November 21, 2025
24	On the Cemenco Feeder	On the Cemenco Feeder, at Cow Factory, Jamaica Road, there is a leaning MV pole.	Resolve the leaning pole issue.	September 15, 2025
25	On the Cemenco Feeder	In the Cemenco Fence, there is one burnt pole. It is also observed that a jumper cable is in close proximity to the cross-arm and a high risk of both coming into contact during strong winds.	Replace the burnt pole and properly install the jumper.	September 15, 2025
26	At Cemenco	Cemenco dedicated transformer of 7.5 MW capacity (indoor) room is very hot due to poor ventilation.	Create ventilation for the transformer.	September 15, 2025
27	UCI Feeder	On the UCI Feeder in the UCI fence, de-commissioned 22 kV insulated cables to a transformer that has been removed almost a year ago is almost	Remove the lines.	By September 15, 2025

		touching the slab of the building providing safety challenges for staff performing works over the slab where the cable is located.		
28	Stockton Creek Distribution Feeders	Badly Leaning MV pole at the Nexium Gas Station.	Resolve the badly leaning pole.	By September 15, 2025
29	Stockton Creek Distribution Feeders	Most of the extensions/T-Offs do not have cut-offs for isolation and safety to carry out maintenance work.	Provide isolation points.	By September 15, 2025
30	Stockton Creek Distribution Network	At the different dead ends, specifically the Stockton Creek - LPRC Feeder, Stockton Creek - New Georgia Feeder from the Stockton Creek Substation, where two circuits dead-end back-to-back on the same pole, there are no isolators (kept in normally open position and locked) to enable switching flexibility when one line has a problem.	Provide isolation to enable safety and switching flexibility when one line has a problem.	By September 15, 2025
31	Stockton Creek Distribution Feeders	Most of the streetlights on Stockton Creek - LPRC and Stockton Creek - New Georgia Feeders are malfunctioning. Some are “ON” during the day, and others are completely damaged.	Repair/replace damaged streetlights.	By September 15, 2025

32	On the Stockton Creek - LPRC Feeder	On the Stockton Creek - LPRC Feeder, in the Cemenco Community, there is an intermediate H-frame transformer pole with incoming 22kV lines being directly tapped from MV lines to HV bushings of a 100 kVA transformer. Providing no means of isolation, one MV pole is also leaning from the T-Off towards Cemenco.	Put in the cross-arm and resolve the leaning pole issue.	By September 15, 2025
33	Stockton Creek Distribution Area	At the United Islamic High School, there is a badly leaning pole.	Resolve the leaning pole issue.	By September 15, 2025
34	Stockton Creek Distribution Area	Along the Somalia Drive, in the vicinity of Battery Factory junction, there is a signboard close to the MV lines and a leaning MV pole.	Resolve this safety concern.	By September 15, 2025
35	Stockton Creek Distribution Area	In Toepo Village (Conneh Yard), Sackor Yard, Blackie Island, Chocolate City, and Kesselly Boulevard, there are low MV lines, and leaning transformer poles in Toepo Village (Conneh Yard).	Resolve the clearance issue and the leaning transformer poles.	By November 21, 2025
36	On the Stockton Creek - New Georgia Feeder, at Chicken Poultry	On the Stockton Creek - New Georgia Feeder, at Chicken Poultry, New Georgia Road, the bare MV line is very close to a building.	Resolve the safety issues using cable sleeves.	September 15, 2025

37	At New Georgia St. Michael	At New Georgia St. Michael, leaning MV poles in Blocks B & D.	Resolve the burnt MV poles in the network.	September 15, 2025
38	On the Stockton Creek - LPRC Feeder and the Stockton Creek - New Georgia Feeder	On the Stockton Creek - LPRC Feeder and the Stockton Creek - New Georgia Feeder, there are a lot of burnt transformer poles and MV poles.	Resolve the burnt MV poles in the network.	September 15, 2025
39	New Georgia Golf	In New Georgia Golf, there are leaning MV poles.	Resolve the MV pole issue.	September 15, 2025
40	Kangar Island along the Somalia Drive	A gap community Kangar Island along the Somalia Drive was identified. Some community dwellers have obtained access to illegal supplies from surrounding communities. This is a potential risk for revenue loss.	Ensure the entire community is electrified.	September 15, 2025
41	Battery Factory, on Silent Street	At Battery Factory, on Silent Street, and in Darquee Town Community, there are leaning MV poles.	Resolve the leaning MV pole issue.	September 15, 2025
42	Free Port Development Community	The LV cables from a 500 kVA supplying customers in the Free Port Development Community (Parco Yard) was reported to experience frequent burns.	Do a load study or survey to replace the cables.	September 15, 2025

43	Stockton Creek Substation	At the New Georgia Nigeria Shop (Cornelia Kruah Yard), vegetation is into the LV lines.	Clear vegetation.	September 15, 2025
44	Stockton Creek Distribution Areas	Many poorly constructed LV networks with deplorable service drops, leaning LV poles, damaged LV poles were observed in the following communities: Free Port Community, Jimmy Car Road Community, Toepo Village (Conneh Yard), Sackor Yard, Battery Factory Plank Field, Blackie Island, Chocolate City, Steel Factory (Papaco), Kesselly Boulevard, Chicken Poetry, New Georgia Road, New Georgia Blocks B & D, Battery Factory (Silent Street), Darquee Town Community, New Georgia Nigeria Shop, New Georgia Golf, Iron Factory, and Doe Community	Resolve the network deficiencies in these areas.	November 21, 2025
45	Stockton Creek Distribution Network	There are many damaged and de-commissioned 15 kVA pole mounted transformers, damaged poles (not in use), and de-commissioned lines in the Free Port Community and Doe	Remove the damaged and decommissioned transformer from the network and properly install the H-frame.	November 21, 2025

		Community. Additionally, towards the Doe Community Park, another 100 kVA transformer mounted on a H-frame is badly leaning.		
46	Stockton Creek Distribution Network	Most of the transformers installed are leaning, the breaker enclosures are burned out, and some of the transformers are damaged without replacement.	Level the leaning transformers in the network and replace all the damaged the enclosures.	September 15, 2025
47	Stockton Creek Distribution Network	Most transformers installed in the Stockton Creek distribution service areas are not level after installation, and the breaker enclosures are either damaged or burnt out.	Level the transformer and replace all damaged transformer breaker enclosures.	By November 21, 2025
48	Stockton Creek Distribution Network	At the Chocolate City junction, vegetation is in the transformer station.	Clear the vegetation.	September 15, 2025
49	Stockton Creek Distribution Network	At Battery Factory, on Silent Street, one of the jumpers on a 200 kVA transformer is cut.	Resolve the issue	September 15, 2025
50	Stockton Creek Distribution Network	At New Georgia St. Michael in Block D, an H-frame transformer station was observed without a transformer. It was reported that the transformer got damaged and was taken for repair almost a year ago. Currently,	Replace the transformer.	November 21, 2025

		the entire Community is supplied by one transformer, which breaker frequently trips.		
51	Stockton Creek Distribution Network	There is one de-commissioned streetlight transformer at Barnesville Junction.	Remove the de-commissioned streetlight transformer.	September 15, 2025
52	Stockton Creek Distribution Network	The roof of a shop is touching the base of a 100 kVA transformer opposite the Doe Community junction (Globe X Corp. LTD), and the shop extends under the transformer poles.	Remove the roof from the transformer.	September 15, 2025
53	Stockton Creek Distribution Network	At MM 2000, Jamaica Road, one of the H-frame poles at a 250 kVA transformer station on the Stockton Creek - LPRC Feeder is burned.	Replace the burned poles.	September 15, 2025
54	Stockton Creek Distribution Network	Most of the transformer stations visited have no meters.	Ensure energy meters are installed across transformer stations.	September 15, 2025
55	Stockton Creek Distribution Network	In the field, there is a lot of meter theft, several homes were observed without meters, and a history of meters being removed by tenants was reported.	Resolve the issue.	November 21, 2025

56	Stockton Creek Distribution Network	There is no history of a meter audit being conducted (no documentation), and there is no record of the total number of meters installed per feeder or transformer.	Ensure meter and transformer audits are done and records are kept on file.	November 21, 2025
57	Stockton Creek Distribution Network	Mobility remains a critical challenge.	Ensure mobility is available.	November 21, 2025
58	Stockton Creek Substation	Damaged floor tiles in the control room and the Office of the Operators.	Ensure the tiles are replaced.	September 15, 2025
59	Stockton Creek Substation	The bathroom plumbing system is malfunctioning at the Substation.	Ensure bathroom is reconditioned.	September 15, 2025
60	Stockton Creek Substation	There is no safety induction meeting held for visitors before entering the switchyard.	Ensure safety induction meeting is held for visitors before entering the switchyard.	December 15, 2025
61	Stockton Creek Substation	A first aid kit is available, but training has not been conducted for some staff members.	Conduct first aid training for all Operators.	December 15, 2025
62	Stockton Creek Substation	Absence of safety officers on every crew performing daily tasks. The supervisors although trained in safety practices can't be performing their supervisory roles and safety roles at the same time.	Ensure safety officers are assigned to every crew performing field work.	December 15, 2025

APPENDIX F. Pictorials from Stockton Creek Distribution Network Areas

Crack on Stockton Creek Control Building

CEMENCO

De-commissioned MV Pole

APPENDIX G. PUNCH LIST OF DEFECTS, ACTIONS REQUIRED, AND TIMELINE FOR CURING DEFECTS IN THE BUSHROD DISTRIBUTION NETWORK AREAS

No.	Location	Defect	Action Required	Completion Date
1	Bushrod Substation	Lack of documentation management.	In line with the Inspection Manual, make all documents available.	By October 14, 2025
2	Bushrod Substation	Absence of Network Planning Report or Network Expansion Plan.	Make available Network Planning Report.	By September 15, 2025
3	Bushrod Substation	Absence of Inventory of Network Transformers installed.	Make available Inventory of Transformers installed in the Network.	By September 15, 2025
4	Bushrod Distribution Network	Absence of the number of customers or loads connected to transformers. LEC lacks supporting documentation.	Ensure meter and transformer audits are done.	By September 15, 2025
5	Bushrod Substation	The network is deteriorating rapidly on the Mount Coffee, Point four and Port Feeders with no evidence of a Network Upgrade Plan.	Ensure Network Upgrade Plan is available and begin execution.	By September 15, 2025
6	Bushrod Substation	Absence of a Maintenance Plan to address existing maintenance challenges.	Ensure Maintenance Plan is available.	By September 15, 2025
7	Bushrod Substation	The substation has a register or logbook. However, it does not include records of the Power frequency, the	Ensure the other parameters are recorded.	By November 21, 2025

		power factor, and the reactive power.		
8	Bushrod Substation	The substation lacks a single line diagram of the network.	Make available a single line diagram of the network in the Substation.	By November 21, 2025
9	Bushrod Substation	There are no switching instructions in the substation.	Ensure switching instructions is available in the substation.	By November 21, 2025
10	Express Feeder	During an outage or if lines/equipment are out of service, the feeders are not locked and tagged.	Ensure locked and tagged protocols are executed.	By September 15, 2025
11	Bushrod Distribution Network	The substation does not have a standby generator.	Use the DC system or Solar PV to keep the substation lighted.	September 15, 2025
12	Bushrod Distribution Network	The flashlight for use during black outs is not functioning properly, as it does not retain power.	Use the DC system or Solar PV to keep the substation lighted.	September 15, 2025
13	Bushrod Substation	The station service transformer, Point-4, GoL 2, and the World Bank 2 breaker can only be “closed” manually instead of the push button.	Ensure all the breaker in the substation are well-functional.	By November 21, 2025
14	Bushrod Substation	The grounding/earthing handle in the Bushrod 66 kV switchyard has been broken for months.	Repair earthing equipment handle.	By November 21, 2025
15	Bushrod Substation	The Substation does not have a fire alarm system.	Ensure fire alarm system is available.	September 15, 2025
16	Bushrod - Kru Town 66 kV	Bushrod - Kru Town 66 kV line is de-energized due to	N-1 is lacking, ensure this issue is	By November 21, 2025

		safety issues regarding a house that is directly constructed under the lines.	resolved and the circuit is restored.	
17	Bushrod Distribution Network	In God Bless You Community, St. Paul Bridge, and Island Clinic, there are very low MV lines, some are at road crossings, and leaning MV poles.	Resolve the network deficiencies in these areas.	By November 21, 2025
18	Port Feeder	At Bong Mines Bridge, an ongoing line diversion is being implemented on account of a burnt MV Pole.	Ensure this pole is replace after the diversion.	September 15, 2025
19	Bushrod Distribution Network	There are a lot of decommissioned MV lines in Logan Town (Zone 10, Depot 2), Logan Town (Little White Chapel), Logan Town (Port Hackor Community), and Jamiaca Road.	Remove decommissioned MV lines.	By November 21, 2025
20	Port Feeder	Burnt T-Off pole (MV) in Logan Town, Little White Chapel.	Replace the burnt pole.	By November 21, 2025
21	Bushrod Distribution Network	At SWAT, Jamaica Road, there are a few badly leaning MV Poles.	Resolve the leaning pole issues.	By November 21, 2025
22	National Port Authority	MV lines passing in an area of the National Port Authority adjacent to an area where some LPRC tanks are located have clearance issue which is a safety concern. Additionally, there are	Use sleeves.	September 15, 2025

		several old poles and a leaning MV pole.		
23	Zuma Town Community, St. Paul Bridge	On the Point 4 Feeder, Zuma Town Community, St. Paul Bridge, the MV lines are very close to a building undermining safety clearance.	Use cable sleeves to resolve this safety concern.	September 15, 2025
24	Zuma Town and LMC	There is a gap between Zuma Town and LMC which is contributing to power theft in the area.	Electrify this gap to stop the theft.	September 15, 2025
25	Point 4 Feeder	There is no record of the number of meters and transformers installed per feeder.	Resolve the issue.	By September 15, 2025
26	Bushrod Distribution Network	Tweah Farm, St. Mary Church, and New Kru Town have leaning MV poles and several decommissioned MV lines and poles on the Point 4 Feeder.	Resolve the leaning MV poles and remove the decommissioned lines from network.	By September 15, 2025
27	Mt. Coffee Express	On the Mt. Coffee Express, right behind Club Beer Factory around the Football Field, there is a building that was broken, but a solid concrete from the structure is left hanging on the MV pole guy. The solid concrete is pulling the pole down.	Resolve this network deficiency.	By September 15, 2025

28	At Macco, at the Beer Factory	At Macco, at the Beer Factory, the lines are close to a structure (building), and the network construction is non-compliant.	Resolve this network deficiencies.	By September 15, 2025
29	Mt. Coffee Express	In Caldwell, New Georgia, the network construction in non-compliant and MV poles are leaning.	Resolve this network deficiencies.	By September 15, 2025
30	Mt. Coffee Express	During the inspection, we observed that a fuse on one phase (middle) of a cut-out was bypassed at Caldwell on the Express Feeder	Replace the bypassed fuse at Caldwell.	By September 15, 2025
31	Caldwell, Chea Chepo Road	Caldwell, Chea Chepo Road, there is one transformer from the main road supplying the entire community; as a result, many customers are experiencing low voltage. There are a lot of rotten poles in the Communities on the Express Feeder.	Resolve this network deficiencies.	By September 15, 2025
32	On the Express Feeder, Dixville Junction and Dixiville Road	On the Express Feeder, Dixville Junction and Dixiville Road, there are low MV lines and leaning MV poles.	Resolve this network deficiencies.	By September 15, 2025
33	Bushrod Distribution Network	There are not many isolation points, especially on T-Offs across all the feeders.	Ensure isolation points are available at T-Offs.	By November 21, 2025

34	At White Plain	At White Plain, the MV lines are very low, almost falling to the ground.	Resolve this network deficiencies.	September 15, 2025
35	On the Express Feeder, on Benson Street	On the Express Feeder, on Benson Street, there are leaning LV poles and poorly maintained LV network.	Resolve this network deficiencies.	September 15, 2025
36	Logan Town, Port Hacker	Logan Town, Port Hacker, one LV circuit is running more than 900m, resulting to the far-end customers being affected by critical Low Voltage.	Resolve this network deficiencies.	September 15, 2025
37	In God Bless You Community, St. Paul Bridge, and Island Clinic	In God Bless You Community, St. Paul Bridge, and Island Clinic, there are poorly maintained LV networks.	Resolve this network deficiencies.	September 15, 2025
38	In Caldwell, New Georgia	In Caldwell, New Georgia, there is a poorly maintained LV network and broken LV poles.	Resolve this network deficiencies.	September 15, 2025
39	In Jennie Farm Community	In Jennie Farm Community, there are poorly maintained LV network.	Resolve this network deficiencies.	September 15, 2025
40	On the Express Feeder, in Forkay Town, Green Land Community	On the Express Feeder, in Forkay Town, Green Land Community, there are poorly maintained LV network and rotten poles.	Resolve this network deficiencies.	September 15, 2025

41	On the Express Feeder, in Caldwell, Lajor	On the Express Feeder, in Caldwell, Lajor, leaning LV poles, poorly maintained LV network, and old enclosures are still installed on poles.	Resolve this network deficiencies.	September 15, 2025
42	Bushrod Distribution Network	On the Point 4 Feeder, Port Feeder, and the Mt. Coffee Express feeder, there are a lot of damaged 25 kVA transformers, damaged or old MV lines, and rotten poles.	Remove the damaged and decommissioned transformer from the network.	November 21, 2025
43	Bushrod Distribution	There are a lot of damaged and decommissioned 15 kVA transformers in the Bushrod distribution network, which poses safety concern.	Remove the damaged and decommissioned transformer from the network.	November 21, 2025
44	Bushrod Distribution	A 315 kVA transformer in Logan Town (Zone 10, Depot 2) and several other transformer breaker enclosures are damaged, with burned pole cases.	Ensure transformer enclosures are closed.	September 15, 2025
45	Bushrod Distribution	Badly leaning 200 kVA transformer poles at Salvation Army, Jamaica Road.	Ensure the transformer is leveled.	By November 21, 2025
46	Bushrod Distribution	Along the Jamaica Road on the Port Feeder, there is a burnt transformer pole.	Replace the burnt transformer pole.	September 15, 2025

47	Bushrod Distribution	Two transformers at NAFAA have very long spans of feeders supplying customers which has led to Voltage drops being experience by customers. It was observed that some breakers on the same transformers have burnt terminals.	Shift the transformer to the load center.	November 21, 2025
48	In Zuma Town Community	In Zuma Town Community, several 15 kVA transformers are damaged and decommissioned raising safety concerns.	Remove the damaged and decommissioned transformer from the network.	November 21, 2025
49	In Zuma Town Community	In Zuma Town Community, Customer connected to a 100 kVA transformer are experiencing low voltage in some areas as reported.	Shift the transformer to the load center.	September 15, 2025
50	Bushrod Distribution Network	Several damaged and decommissioned 15 kVA transformers, decommissioned MV lines, and poles are seen on the Point 4 Feeder, this raises safety concern.	Remove the damaged and decommissioned MV lines, poles, and the transformer from the network.	September 15, 2025
51	Bushrod Distribution Network	At LMC, there is a badly leaning 50 kVA transformer with oil leakage.	Ensure the transformer is leveled and the leakage is resolved.	September 15, 2025

52	Bushrod Distribution Network	On the Express Feeder in Fofee Town, where the 200 kVA transformer supplies all the nearby communities, some customers are experiencing low voltage as reported. A lot of customers are connected to the single-phase cables/service, and stringing is done using sticks.	Shift the transformer to the load center.	September 15, 2025
53	Bushrod Distribution Areas	During the replacement of a smaller transformer with a bigger one, adequate protection of the LV cable in not being considered during sizing resulting to the frequent burning of LV cables on account of overload.	Ensure adequate protection of the LV cable is being considered during sizing to avoid burning of LV cables in the network.	September 15, 2025
54	Point 4 Feeder	Tweah Farm, St. Mary Church, and New Kru Town there are damaged transformer breaker enclosures on the Point 4 Feeder.	Replace all the burnt transformer breaker enclosures in the network	September 15, 2025
55	Express Feeder	During the inspection, we observed leaning transformer poles, burnt or damaged breaker enclosures,	Replace all the burnt transformer breaker enclosures in the network.	September 15, 2025

		New Georgia, Faith Island, on the Express Feeder.		
56	Jennie Farm Community	Jennie Farm Community, most of the transformer stations we visited have burnt enclosures, and leaning transformers on the Express Feeder.	Replace all the burnt transformer breaker enclosures in the network.	September 15, 2025
57	Bushrod Distribution Areas	Most of the transformer stations we visited are not level; they start leaning from the construction stage.	Ensure all leaning transformers are leveled and aligned.	September 15, 2025
58	On the Express Feeder	On the Express Feeder, there is one 200 kVA transformer installed at the Louisiana Market that supplies electricity to all the other nearby communities. Some customers are experiencing low voltage at the far end as reported. The service drops, and LV cables are strung on sticks and iron poles.	Resolve the network deficiencies in these areas.	September 15, 2025
59	Bushrod Distribution Network	Most of the transformer stations visited do not have energy meters.	Ensure energy meter is installed at every transformer station.	September 15, 2025

60	Bushrod Distribution Network	Metering across the Bushrod distribution network coverage area is inadequate, with an increase in power theft.	Ensure every electricity user is metered in the network.	September 15, 2025
61	Bushrod Distribution Network	There is no history of a meter audit being conducted (no documentation), and there is no record of the total number of meters installed per feeder.	Ensure meter and transformer audits are done and records are kept on file.	September 15, 2025
62	Bushrod FBBU	Absence of relevant tools and equipment for line workers.	Ensure tools are available for staff to carry out work.	September 15, 2025
63	Bushrod Substation	The Container Office for the Substation Operators is in an unclean condition. Does not lock from the inside, the chairs are broken, and the AC is not cooling properly.	Resolve all the deficiencies in the Substation.	September 15, 2025
64	Bushrod Substation	The switchyard is kept unclean (weed/vegetation).	Ensure weed is always cleared and add more crushed rocks to prevent weed from growing in the switchyard.	September 15, 2025
65	Bushrod Substation	Bushrod Substation does not have a bathroom, even though Operators serve night shifts.	Ensure the bathroom is available in the Substation.	September 15, 2025

66	Bushrod Substation	There is no availability of water facility at Bushrod Substation.	Ensure water is available at all time in the Substation.	September 15, 2025
67	Bushrod Substation	A first aid kit is available, but training has not been conducted for some staff members.	Conduct training for all operators.	September 15, 2025
68	Bushrod Distribution Network	Absence of safety officers on every crew performing daily tasks. The supervisors although trained in safety practices can't be performing their supervisory roles and safety roles at the same time.	Ensure safety officers are on every crew working in the field.	September 15, 2025
69	Bushrod Substation	There is no safety induction meeting held for visitors before entering the switchyard	Conduct safety induction meeting for visitors before entering the switchyard.	September 15, 2025

APPENDIX H. Pictorial from Bushrod Distribution Network Areas

De-stringing 22 kV Lines

Poor Service Drops

APPENDIX I. PUNCH LIST OF DEFECTS, ACTIONS REQUIRED, AND TIMELINE FOR CURING DEFECTS IN THE KRU TOWN DISTRIBUTION NETWORK AREAS

No.	Location	Defect	Action Required	Completion Date
1	Kru Town Distribution Area	Lack of documentation management.	In line with the Inspection Manual, make all documents available.	By October 14, 2025
2	Kru Town Distribution Area	Absence of Network Planning Report or Network Expansion Plan.	Ensure Network Expansion Plan is available.	By October 14, 2025
3	Kru Town Distribution Area	Absence of Inventory of Network Transformers installed.	Ensure inventory of Distribution Transformer is done.	By October 14, 2025
4	Kru Town Distribution Area	Absence of the number of customers or loads connected to transformers. Some transformers do not have energy meters.	Ensure transformer and meter audits are done. Transformer load should be frequently monitored, logged and kept on file; additionally, ensure energy meters are install across all transformers.	By October 14, 2025
5	Kru Town Distribution Area	No evidence of a Network Upgrade Plan.	Ensure a Network Upgrade Plan is available.	By October 14, 2025
6	Kru Town Distribution Area	The substation does not have a single line diagram of the network.	Provide a single-line diagram (SLD) for the Gardnerville network configuration.	By September 15, 2025
7	Kru Town Substation	There is no switching instructions present in the substation.	Make switching instructions available.	By September 15, 2025

8	Kru Town Distribution Area	No history of metering and transformer audits. No available data on the number of meters and transformers installed on each feeder.	Ensure meter and transformer audits are done and records are kept on file. .	By September 15, 2025
9	Kru Town Substation	The Substation logbook does not include records of the Power frequency, the power factor, and the reactive power	Ensure these data are also recorded hourly and kept. .	By September 15, 2025
10	Kru Town Substation	Absence of substation maintenance history/evidence or maintenance plan.	Ensure maintenance Plan is available.	By November 21, 2025
11	Kru Town Substation	There is no fire alarm system	Ensure a fire alarm system is available	By November 21, 2025
12	Kru Town Substation	The substation does not have a standby generator. Additionally, the flashlight/emergency power does not keep power.	Ensure solar system is used, or use the DC to keep the control room lighted.	By November 21, 2025
13	Kru Town Sub Switchyard	The Water & City rise-up pole is broken.	Resolve the issue	By September 15, 2025
14	Kru Town Substation	The desktop has some issues at the Substation. Encourage computerized data collection.	Resolve the issue	September 15, 2025
15	Kru Town Substation	A lot of steam/dirt on the control building.	Paint the control building and insecticide the control room to get rid of mosquitoes.	September 15, 2025

16	Kru Town Substation	There are a lot of old desks and cubicles found in the substation.	Dispose of old desks and cubicles.	By November 21, 2025
17	Kru Town Substation	The fence around the power transformers and the isolators is broken	Repair switchyard transformer fence.	By November 21, 2025
18	Kru Town Substation	Damaged lights in the indoor 66 kV control room.	Repair damaged lights.	September 15, 2025
19	Kru Town Substation	Damaged old switchgear in the substation yard.	Dispose of damaged switchgear.	By November 21, 2025
20	Bushrod to Kru Town	The Bushrod to Kru Town 66 kV overhead circuit is currently de-energized due to safe clearance in the Doe Community area, where the circuit is passing over a structure.	N-1 is lacking, resolve the clearance issue and restore the line.	By November 21, 2025
21	Kru Town Substation	On the Mamba Point Feeder, the Ministry of Justice informed the team that LEC has not been able to restore or transfer their token/credit from the old meter to the new one they currently use.	Transfer all previous token to the current account.	September 15, 2025
22	Kru Town Distribution Areas	There are a few damaged streetlights still installed on the poles; some are at the point of falling.	Remove all damaged streetlights from the network.	By November 21, 2025
23	Kru Town Distribution Areas	LTA cables are installed anyway on LEC poles.	Coordinate with LTA to avoid future occurrences.	By November 21, 2025

24	Kru Town Distribution Areas	Some of the connections are done without the use of connectors.	Make use of connectors.	September 15, 2025
25	Kru Town Distribution Areas	There is a leaning pole at the Up Town Garage.	Rectify the issue.	September 15, 2025
26	Kru Town Distribution Areas	In West Point and Clara Town, the LV cables and service drops are poorly done, and most of the customers are directly hooked to the transformers without meters.	Resolve the issue of poor service drop and design a method of metering for these communities.	September 15, 2025
27	Kru Town Distribution Areas	Most of the LV cables around the Low Voltage Distribution Box are being peeled; this is across all the feeders. This is hazardous for other team members who may not know, or for children who always play with and around these LVDBs.	The LEC Crew must be mindful of the work they do; peeling these conductors puts staff, community, and kids at risk, as the transformers are not fenced.	By September 15, 2025
28	Kru Town Distribution Areas	In West Point, Slip Way, and Clara Town, there are lots of damaged or rotten LV poles, and damaged 15 kVA and 25 kVA transformers. Some are at the point of falling.	Remove the rotten poles, damaged lines, and damaged transformers in the network.	By September 15, 2025

29	Kru Town Distribution Areas	Some of the LV cables used on the MCCB are of poor quality; as a result, these cables burn inside or outside the MCCB Box.	Use standard materials to avoid the burning of LV cables.	By September 15, 2025
30	Kru Town Distribution Areas	There is vegetation in the French Power Sub transformer station.	Clear all vegetation at the different transformer stations in the network.	By September 15, 2025
31	Camp Johnson and McDonald Streets intersection	On the Water & City Feeder at Camp Johnson and McDonald Streets intersection, there are two damaged transformers: 200 kVA and 50 kVA. On Crown Hill, there is another damaged 200 kVA.	Repair the faulty transformers in the network and remove the damaged ones.	By September 15, 2025
34	UBA	There is a single phasing at UBA, or one of the jumpers connecting to the 500 kVA supplying UBA is cut. Additionally, the pole is burned, and the enclosures are damaged.	Resolve all the defects.	By September 15, 2025
35	Cathedral Catholic High School	At the Cathedral Catholic High School, the transformer breaker enclosures are damaged, and one jumper is cut from the arrester.	Ensure all damaged transformer enclosures, including all other defects associated with transformers, are resolved.	By September 15, 2025

36	GAC on Ashmun Street	There is a pole-mounted 500 kVA at GAC on Ashmun Street; the pole is burned from the top, and it's rotten from the bottom. The breaker enclosures are damaged.	Resolve all the defects.	By November 21, 2025
37	Vai Town Feeder, at Sham Incorporated Compound in Vai Town	On the Vai Town Feeder, at Sham Incorporated Compound in Vai Town, there is a 500 kVA delegated transformer; the compound experiences voltage fluctuation at times.	Resolve the issue.	September 15, 2025
38	Coastal Areas	The Low-Voltage Distribution Boxes and transformers along the coastal belt are rusting.	Procure specialized materials and equipment for the coastal areas.	September 15, 2025
39	Metering in Kru Town Distribution Network	There is no record of the total number of meters installed per feeder.	Ensure the total number of meters installed per feeder and transformer are recorded and kept on file.	September 15, 2025
40	Metering in Kru Town Distribution Network	Most of the pole-mounted meter enclosures are damaged on all the feeders from the Kru Town Substation.	Ensure all meters are installed per regulation.	September 15, 2025
41	Kru Town Substation	The desktop in the Kru Town Substation is malfunctioning.	Resolve the Problem	September 15, 2025

42	Kru Town Substation	Bathroom locks are damaged.	Repair bathroom locks.	September 15, 2025
43	Kru Town Substation	Lack of practical application of fire extinguisher training.	Conduct training	September 15, 2025
44	Kru Town Substation	Absence of safety officers on every crew performing daily tasks. The supervisors although trained in safety practices can't be performing their supervisory roles and safety roles at the same time.	Ensure Safety Officers are on every crew to monitor health and safety issues in the field.	November 21, 2025
45	Kru Town Substation	There is no safety induction meeting held for visitors before entering the switchyard.	Ensure safety induction is conducted for visitors before entering the switchyard.	September 15, 2025
46	Kru Town Substation	Lack of drinking water and shortage of tea supply.	Ensure the supply of water and tea are always done.	September 15, 2025

APPENDIX J. Pictorials from Kru Town Distribution Network Areas

Damaged Transformer Breaker Enclosures

Rusting Low-Voltage Distribution Box Along the Coastal Belt

APPENDIX K. PUNCH LIST OF DEFECTS, ACTIONS REQUIRED, AND TIMELINE FOR CURING DEFECTS IN THE CAPITOL DISTRIBUTION NETWORK AREAS

No.	Location	Defect	Action Required	Completion Date
1	Capitol Substation	Lack of documentation management.	In line with the Inspection Manual, make all documents available.	By October 14, 2025
2	Capitol Network	No evidence of a Network Upgrade Plan.	Ensure a Network Upgrade Plan is developed.	By October 14, 2025
3	Capitol network	Absence of Network Planning Report or Network Expansion Plan.	Ensure a Network Expansion Plan is developed.	By October 14, 2025
4	Capitol Network	Absence of Inventory of Network Transformers installed.	Ensure transformer Inventory is done.	By October 14, 2025
5	Capitol Network	Some transformers do not have energy meters.	Ensure energy meters are install across transformer stations.	By October 14, 2025
6	Capitol Substation	The substation does not have a single line diagram of the network.	Provide a single-line diagram (SLD) for the network.	By September 15, 2025
7	Capitol Substation	There is no switching instructions present in the substation.	Make switching instructions available.	By September 15, 2025
8	Capitol Substation	No history of metering and transformer audits. No available data on the number of meters and transformers installed on each feeder.	Ensure meter and transformer audits are done and records are kept on file.	By September 15, 2025

9	Capitol Substation	The Substation logbook does not include records of the Power frequency, the power factor, and the reactive power	Ensure these data are recorded hourly and kept on file.	By September 15, 2025
10	Capitol Substation	Absence of substation maintenance history/evidence or maintenance plan.	Ensure the availability of a maintenance Plan.	By November 21, 2025
11	Capitol Substation	There is no fire alarm system.	Ensure a fire alarm system is available.	By November 21, 2025
12	Capitol Substation	The standby generator at the Capitol Substation is damaged. Additionally, the flashlight/emergency power does not keep power on longer.	The availability of power in the control room at all times is essential; ensure solar system is used, or use the DC to keep the control room lighted.	By November 21, 2025
13	On 15th Street	On 15th Street, at ECO Hotel, 66 kV lines pass over a structure.	Use cable sleeves	By November 21, 2025
14	Wroto Town	In Wroto Town, Air Field Short Cut, structures are being constructed between the tower footings.	Remove these structures.	September 15, 2025
15	Stockton Creek to Capitol 66 kV	Around Crown Hill, the underground 66 kV was cut and stolen along with some tower members.	N-1 is lacking restore the circuit.	September 15, 2025
16	Capitol Hill Feeder	On the Capitol Hill Feeder, on the University of Liberia Main Campus, the construction is done	Resolve the low clearance issue.	By November 21, 2025

		using bare secondary; however, the construction is poorly done with several conductors almost touching the ground, this raises safety concern.		
17	At the back of the Executive Mansion	At the back of the Executive Mansion, at NAO, a few MV poles are poorly constructed, decommissioned poles in the network, a leaning MV pole, and vegetation is growing along the lines.	Resolve these issues.	By November 21, 2025
18	Bypassed to the University of Liberia	Poor MV construction from Bypassed to the University of Liberia Main Campus.	Resolve the issue.	September 15, 2025
19	At the back of the Executive Mansion	Some Isolators are bypassed in the network, for example, at the back of the Executive Mansion at the 500 kVA transformer.	Replace the isolator.	By November 21, 2025
20	Jallah Town and Saye Town	There is a low MV clearance at the road crossing in Jallah Town, and old MV poles are found in Jallah Town and Saye Town.	Resolve the issue.	By November 21, 2025
21	Capitol Distribution Network	Most of the streetlights in communities are on 24/7 on all feeders.	Ensure damaged streetlights are replaced.	September 15, 2025

22	Ministry of Foreign Affairs	At the Ministry of Foreign Affairs, there is a 25 kVA transformer for streetlights, and the pole is burnt.	Replace the burnt pole.	By November 21, 2025
23	Buzzi Quarter, Jallah Town, Saye Town, and other places.	A few 15 kVA and 25 kVA transformers are found in the network in Buzzi Quarter, Jallah Town, Saye Town, and other places.	Remove all damaged transformers and poles from the network.	By November 21, 2025
24	Coastal Areas	Transformers around Coastal areas are rusting, for example, around the Commission on Arms. Additionally, there is a fluctuation and a low voltage issue at the Commission on Small Arms.	Ensure specialized materials and equipment are procured for coastal areas.	By November 21, 2025
25	MCC, the back of the Executive Mansion, Sinkor, Jallah Town, Saye Town, National Disaster Management Agency, PHP, and other places.	There are a lot of damaged transformer enclosures on all the feeders from the Capitol Substation.	Ensure damaged transformer breaker enclosures are resolved.	September 15, 2025
26	Gurley Street, Beach Side	On Gurley Street, Beach Side, a 500 kVA transformer fence is damaged. It has become vulnerable to unauthorized persons and a safety risk.	Rectify the issue	September 15, 2025

27	Temple of Justice	At the Temple of Justice, there is a dedicated transformer that is ground-mounted. During heavy rain, the water sets at the transformer, vegetation has grown in the area. The customer informed the team that the transformer does not take their entire load whenever the Supreme Court comes ON. In this case, to power the Supreme court, they have to put the standby generator ON.	Resolve the issue.	September 15, 2025
28	National Disaster Management Agency	The National Disaster Management Agency Technicians complained of LEC not being able to transfer their token from the old meter to the new one.	Transfer all previous tokens to the current account.	By September 15, 2025
29	Capitol Distribution Network	Most of the pole-mounted meter enclosures are damaged on all the feeders from the Capitol Substation.	Replace the enclosures.	By September 15, 2025
30	Buzzi Quarter	There is a history of a damaged 15 kVA transformer falling	Remove all damaged transformers and	By September 15, 2025

		from the pole, and there are still many damaged 15 kVA & 25 kVA transformers, and old poles in the network.	poles from the network.	
31	Capitol Substation	The desktop has not been installed at the Substation. Encourage computerized data collection.	Resolve all the defects.	By September 15, 2025
33	Capitol Substation	Leakage in the control room over the 22 kV switchgear.	Leakage in the switchgear is dangerous; resolve this issue urgently.	By September 15, 2025
34	Capitol Substation	One of the standing ACs is damaged in the control room.	Replace the damaged ACs in the control room. .	By November 21, 2025
35	Capitol Substation	The substation exit door is damaged.	Resolve the issue.	September 15, 2025
36	Capitol Substation	Power transformer 1 bushings are damaged.	Resolve the issue.	September 15, 2025
37	Capitol Substation	There is no safety induction meeting held for visitors before entering the switchyard.	Ensure safety meeting is held before accessing the switchyard.	September 15, 2025
38	Capitol Substation	Absence of safety officers on every crew performing daily tasks. The supervisors although trained in safety practices can't be performing their supervisory roles and	Ensure Safety Officers are on every crew to monitor health and safety issues.	September 15, 2025

		safety roles at the same time.		
39	Capitol Substation	Lack of warehouse facility.	Ensure proper storage of materials.	September 15, 2025
40	Old Health Ministry	Burnt old H-Frame poles, the old Ministry of Health.	Remove the old structure.	September 15, 2025

APPENDIX L. Pictorials from Capitol Distribution Network Areas

Leakage Over 22 kV Switchgear

University of Liberia Internal Network

APPENDIX M. PUNCH LIST OF DEFECTS, ACTIONS REQUIRED, AND TIMELINE FOR CURING DEFECTS IN THE CONGO TOWN DISTRIBUTION NETWORK AREAS

No.	Location	Defect	Action Required	Completion Date
1	CONGO TOWN SUBSTATION	Lack of documentation management.	In line with the Inspection Manual, make all documents available.	By October 14, 2025
2	CONGO TOWN NETWORK	Absence of a Network Upgrade and Maintenance Plan.	Ensure Network Upgrade is developed.	By October 14, 2025
3	CONGO TOWN NETWORK	Absence of Network Planning Report or Network Expansion Plan.	Ensure Network Planning Report and Network Expansion Plan are developed.	By October 14, 2025
4	CONGO TOWN NETWORK	Absence of Inventory of Network Transformers installed.	Regularly take Inventory of Network Transformers and keep record on file.	By October 14, 2025
5	CONGO TOWN NETWORK	Some transformer stations do not have energy meters.	Ensure all transformer stations have energy meters for energy accounting purpose.	By October 14, 2025
6	CONGO TOWN SUBSTATION	The substation does not have a single line diagram of the network.	Provide a single-line diagram (SLD) for the Gardnerville network configuration.	By September 15, 2025
7	CONGO TOWN SUBSTATION	There is no switching instructions present in the substation.	Make switching instructions available.	By September 15, 2025
8	CONGO TOWN DISTRIBUTION NETWORK	No history of metering and transformer audits. No available	Ensure meter and transformer audits are done and	By September 15, 2025

		data on the number of meters and transformers installed on each feeder.	records are kept on file.	
9	CONGO TOWN SUBSTATION	The Substation logbook does not include records of the Power frequency, the power factor, and the reactive power	Ensure these data are recorded hourly and kept on file.	By September 15, 2025
10	CONGO TOWN SUBSTATION	Absence of substation maintenance history/evidence or maintenance plan.	Ensure the availability of a maintenance Plan.	By November 21, 2025
11	CONGO TOWN SUBSTATION	Fire alarm system damaged.	Ensure a fire alarm system is available.	By November 21, 2025
12	CONGO TOWN SUBSTATION	The DC supply emergency lighting system and the AC supply lighting are malfunctioning.	Ensure solar lights are used or use the DC to keep the control room lighted.	By November 21, 2025
13	CONGO TOWN SUBSTATION	Desktop monitor for SCADA system malfunctioning.	Resolve the issue.	By November 21, 2025
14	CONGO TOWN SUBSTATION	Handset and base radio are all damaged. Operators are using a desk phone to conduct switching.	Conducting switching activities on the phone is not a good practice, restore the communication system.	September 15, 2025
15	CONGO TOWN SUBSTATION	Damaged and decommissioned Neutral Earthing Resistor still in switchyard.	Remove the damaged NER.	September 15, 2025
16	CONGO TOWN SUBSTATION	Substation understaffed/limited manpower for the	Understaffing of a Unit creates work overload, stress, and reduced	By November 21, 2025

		operation of the substation.	productivity. Ensure adequate staff are available.	
17	CONGO TOWN SUBSTATION	The dropout fuses at the riser-up cables for all four feeders are bypassed.	Resolve these issues.	By November 21, 2025
18	CONGO TOWN DISTRIBUTION NETWORK	A few are leaning MV poles at Kalindo-Old Road, at the back of Cuttington Graduate School, Transformer Community-Old Road, KIA, etc.	Resolve the issue.	September 15, 2025
19	CONGO TOWN DISTRIBUTION NETWORK	Some streetlights are on 24/7, while others are damaged.	Replace the isolator.	By November 21, 2025
20	CONGO TOWN DISTRIBUTION NETWORK	There is a leaning cross arm at Chugbor, Old Road.	Resolve the issue.	By November 21, 2025
21	CONGO TOWN DISTRIBUTION NETWORK	Low LV conductors in New Matidi, Kalindo-Old Road, the back of Cuttington Graduate School, Pototorie, Cabra Estate, etc.	Resolve all low LV cable issues.	By November 21, 2025
22	CONGO TOWN DISTRIBUTION NETWORK	A few are leaning MV poles in Kalindo-Old Road, at the back of Cuttington Graduate School, Transformer Community-Old Road, KIA, etc.	Resolve all leaning pole cases.	By November 21, 2025
23	CONGO TOWN DISTRIBUTION NETWORK	A few old poles and rotten poles are still in the network in communities like 8th Street, from Catholic	Remove all old and rotten poles.	By November 21, 2025

		Junction to Catholic Hospital, etc.		
24	CONGO TOWN DISTRIBUTION NETWORK	There are lots of damaged transformer breaker enclosures in Matidi, Sinkor, Old Road, Congo Town, Lakpazee Zoo, Gbangaye Town, National Identification Registry, LACC, A.M. Dogliotti College of Medicine, Pototorie, Gaye Town, Smart Road, Chugbor, VP Road, Cabra Estate, Pagos Island, etc., across all feeders from the Congo Town Substation.	Ensure the issue of burnt transformer breaker enclosure is resolved. Transition to LVDB or MCCB Box.	September 15, 2025
25	CONGO TOWN DISTRIBUTION NETWORK	Leaning transformers in West Point, Lakpazee, Matidi, National Identification Registry, Weasay, etc.	Rectify the issue	September 15, 2025
26	CONGO TOWN DISTRIBUTION NETWORK	A few damaged 15 kVA transformers are still mounted/installed on the poles in communities like Matidi, Congo Town Backroad, etc.	Remove the damaged transformer from the network.	September 15, 2025
27	CONGO TOWN DISTRIBUTION NETWORK	Transformers installed in coastal environments are fast-rusting.	Ensure specialized materials and equipment are procured for coastal areas.	By September 15, 2025
28	CONGO TOWN DISTRIBUTION NETWORK	There is an old gantry structure at Kalindo-Old Road in	Remove the old gantry structure at Kalindo.	By September 15, 2025

		Transformer Community.		
29	CONGO TOWN DISTRIBUTION NETWORK	For over two weeks, a 100 kVA transformer has been damaged in Gaye Town, Old Road.	Replace the damaged transformer.	By September 15, 2025
30	CONGO TOWN DISTRIBUTION NETWORK	One LVDB is damaged in Pototorie Community	Replace all damaged LVDB.	By September 15, 2025
31	CONGO TOWN DISTRIBUTION NETWORK	Most of the pole-mounted enclosure covers are either removed or damaged.	Resolve all the defects.	By September 15, 2025
32	CONGO TOWN DISTRIBUTION NETWORK	Vegetation grown in several transformer stations: New Matidi, Dr. Dweh Clinic, New Matidi-Don Bosco, Transformer Community-Old Road, London Community, Liberty Party Headquarters-Opposite YWCA, Key Hole Community, Chugbor Community, etc.	Clear vegetation	September 15, 2025
33	CONGO TOWN DISTRIBUTION NETWORK	Most of the air conditioning systems are malfunctioning.	Resolve the issue	September 15, 2025
34	CONGO TOWN DISTRIBUTION NETWORK	No running water in the bathroom.	Resolve the issue	September 15, 2025

35	CONGO TOWN DISTRIBUTION NETWORK	The erosion has damaged the entrance of the substation at the gate, making it difficult for vehicles to enter.	Resolve the issue	September 15, 2025
36	CONGO TOWN DISTRIBUTION NETWORK	There is no safety induction meeting held for visitors before entering the switchyard.	Ensure a safety meeting is held for visitors before accessing the switchyard.	September 15, 2025
37	CONGO TOWN DISTRIBUTION NETWORK	Absence of safety officers on every crew performing daily tasks. The supervisors although trained in safety practices can't be performing their supervisory roles and safety roles at the same time.	Ensure Safety Officers are on every crew to monitor health and safety issues.	September 15, 2025
38	Congo Town Substation	There is a sinking concrete settlement near the station service transformer, this raises a safety concern.	Resolve the issue	September 15, 2025

APPENDIX N. Pictorials Congo Town Distribution Network Areas

Vegetation at Transformer Station

Old Gentry Structure at Kalindo-Old Road

APPENDIX O. PUNCH LIST OF DEFECTS, ACTIONS REQUIRED, AND TIMELINE FOR CURING DEFECTS IN THE VIRGINIA DISTRIBUTION NETWORK AREAS

No.	Location	Defect	Action Required	Completion Date
1	Virginia Substation	Lack of documentation management.	In line with the Inspection Manual, make all documents available.	By October 14, 2025
2	Virginia Substation	Absence of Network Planning Report or Network Expansion Plan.	Ensure Network Planning Report and Network Expansion Plan are developed.	By October 14, 2025
3	Virginia Substation	Absence of Inventory of Network Transformers installed.	Ensure Inventory of Network Transformers is done.	By October 14, 2025
4	Virginia Substation	Absence of the number of customers or loads connected to transformers, LEC lacks supporting documentation, and absence of metering and transformer audits.	Ensure the total number of customers and load connected to transformer are recorded and kept on file.	By October 14, 2025
5	Virginia Substation	The substation does not have a single line diagram of the network.	Provide a single-line diagram (SLD) for network configuration.	By September 15, 2025
6		There is no switching instruction in the substation.	Make switching instructions available.	By September 15, 2025
7	Virginia Substation	No history of metering and transformer audits. No available data on the number of meters and	Ensure meter and transformer audits are done and records are kept on file.	By September 15, 2025

		transformers installed on each feeder.		
8	Virginia Substation	The Substation logbook does not include records of the Power frequency, the power factor, and the reactive power	Ensure these data are recorded hourly and kept.	By September 15, 2025
10	Virginia Substation	Absence of substation maintenance history/evidence or maintenance plan.	Ensure the availability of a maintenance Plan.	By November 21, 2025
11	Virginia Substation	There is no fire alarm system.	Ensure a fire alarm system is available.	By November 21, 2025
12	Virginia Substation	The DC supply emergency lighting system and the AC supply lighting are all malfunctioning.	The availability of power in the control room at all times is essential; ensure solar lights are used, or use the DC to keep the control room lighted.	By November 21, 2025
13	Virginia Substation	There is no padlock and tag to implement the locked and tagged principle during maintenance works. There is no padlock for securing the equipment in the 66 kV switchgear during maintenance work.	Resolve the issue.	By November 21, 2025
14	Virginia Substation	The station service transformer is leaking oil.	Resolve the leakage.	September 15, 2025
15	Virginia Substation	One of the Gel batteries in the battery bank is swelling.	Remove the swollen battery.	September 15, 2025

16	Virginia Substation	Some of the equipment/panel locking facilities are damaged. As a result, the panels are opened while dust is entering them.	Ensure locking facilities are repaired.	By November 21, 2025
17	Virginia Substation	Operators complained of not getting their monthly tea and water supply.	Resolve these issues.	By November 21, 2025
18	Virginia Distribution Areas	Some streetlights are on 24/7, while others are damaged.	Resolve the issue.	September 15, 2025
19	Virginia Distribution Areas	Around the Conference Center in Profile Community, the distribution transformer is installed very far from some customers; as a result, there are many customers faced with low voltage (160 V to 170 V). Because of this low voltage, many customers have removed their meters.	Resolve the issue.	By November 21, 2025
20	Virginia Distribution Areas	Most of the transformer stations do not have streetlights.	Resolve the issue.	By November 21, 2025
21	Virginia Distribution Areas	At Brewerville Store, Banjor Police Station, there are badly leaning MV poles along the road.	Resolve the issue.	September 15, 2025

22	Virginia Distribution Areas	At the Banjor Community Clinic, the MV conductor and insulator have all changed orientation.	Resolve the issue.	By November 21, 2025
23	Virginia Distribution Areas	At Jartu Town, there is a low MV sag.	Resolve the issue.	By November 21, 2025
24	Virginia Distribution Areas	At Prince Avenue, there is a leaning MV and a low MV sag at Lonestar Tower, Prince Avenue.	Resolve the issue.	By November 21, 2025
25	Virginia Distribution Areas	At Gbokon, there is an MV that was built by the Project Team over five years ago; the line has no transformer, and it has started falling on the ground.	Recondition the lines and install transformers, and get customers connected.	September 15, 2025
26	Virginia Distribution Areas	In Carpetville, the MV conductor that passes over homes is almost at the point of breaking.	Rectify the issue	September 15, 2025
27	Virginia Distribution Areas	At the St. Paul Catholic Church, there is a low MV conductor.	Rectify the issue.	September 15, 2025
28	Virginia Distribution Areas	The Iron Gate extension toward Mango Town has leaning MV poles.	Resolve the issue	By September 15, 2025
29	Virginia Distribution Areas	During our inspection, we noticed the GA-Project execution is also leaving some gaps in some communities, which leaves the surrounding	Provide electricity for all customers.	By September 15, 2025

		communities without power.		
30	Virginia Distribution Areas	There is a low MV conductor on the Sam Gibson Road or Virginia Waterside Road.	Resolve the issue.	By September 15, 2025
31	Virginia Distribution Areas	At Riverside Beach, the LV conductor is strung using metal poles.	The Beach is a public place; replace the metals/iron with wooden, steel, or concrete poles.	By September 15, 2025
32	Virginia Distribution Areas	At Ansu Soni University, the LV is strung on coconut trees.	Resolve the issue.	By September 15, 2025
33	Virginia Distribution Areas	There is a falling bundled LV conductor along the road at God Blessing Hill.	Resolve the issue.	By September 15, 2025
34	Virginia Distribution Areas	On Nuka Road, there is a broken LV pole.	Resolve the issue.	September 15, 2025
35	Virginia Distribution Areas	At the St. Paul Catholic Church, there a low LV and MV conductors.	Resolve the issue	September 15, 2025
36	Virginia Distribution Areas	A few transformer breakers are damaged across all three feeders.	Transition to LVDB or MCCB Box.	September 15, 2025
37	Virginia Distribution Areas	Water enters the substation through the windows.	Resolve the issue	September 15, 2025

38	Virginia Distribution Areas	There is no sitting facility/there are no chairs for the Operators. The Commission is told that chairs are borrowed from the community.	Make available chairs.	September 15, 2025
39	Virginia Distribution Areas	The borehole/well is damaged, coffee is no longer supplied, and there is no water in the substation. Additionally, the pump is damaged.	Ensure water is available, and coffee is supplied for the Operators.	September 15, 2025
40	Virginia Distribution Areas	The security booth's glass door is broken/damaged, and there is no chair.	Make available chairs and fix the booth.	September 15, 2025
41	Virginia Substation	Some Operators have not experienced first aid training.	Conduct first aid training.	September 15, 2025
42	Virginia Substation	All the door handles are damaged.	Resolve the issue.	September 15, 2025
43	Virginia Substation	The ACs are malfunctioning.	Resolve the issue.	September 15, 2025
44	Virginia Distribution Areas	Absence of safety officers on every crew performing daily tasks.	Ensure Safety Officers are on every crew to monitor health and safety issues.	September 15, 2025
45	Virginia Substation	Lack of warehouse facility.	Ensure proper storage of materials.	September 15, 2025

46	Virginia Distribution Areas	Many homes use power without meters.	Ensure homes are served with meters.	September 15, 2025
47	Virginia Distribution Areas	There is a massive upgrade/construction of the network under the LESSAP Project; however, the existing poles (wood) and insulators are not being changed by the executing agency. Hence, the insulators and wood poles are leaning in some area.	Ensure the insulators are installed proper and the poles and lines are aligned.	September 15, 2025

APPENDIX P. Pictorials from Virginia Distribution Network Areas

Low Bundled Conductor

LV Strung on Metal

APPENDIX Q. PUNCH LIST OF DEFECTS, ACTIONS REQUIRED, AND TIMELINE FOR CURING DEFECTS AT THE MT. COFFEE SUBSTATION

No.	Location	Defect	Action Required	Completion Date
1	MT. COFFEE SUBSTATION	There is no switching instruction in the substation.	Make switching instructions available.	By September 15, 2025
2	MT. COFFEE SUBSTATION	Having only one person on shift operating the substation is dangerous for their safety. During the switching exercise, the person might lose consciousness, or the staff might become unconscious, and if no one is nearby, it could lead to serious problems.	Ensure adequate manpower is available to operate the substation. One staff member on duty in a power station is not advisable.	By September 15, 2025
3	MT. COFFEE SUBSTATION	The Substation logbook does not include records of the Power frequency, the power factor, and the reactive power.	Ensure these data are recorded hourly and kept. Computerized data collection is needed.	By September 15, 2025
4	MT. COFFEE SUBSTATION	Absence of substation maintenance history/evidence or maintenance plan.	Ensure the availability of a maintenance Plan.	By November 21, 2025
5	MT. COFFEE SUBSTATION	The fire alarm system is damaged.	Ensure a fire alarm system is available.	By November 21, 2025
6	MT. COFFEE SUBSTATION	There is no spare 22 kV switchgear.	Although the 22 kV switchgears are for internal supply, ensure a spare breaker/switchgear is available.	By November 21, 2025

7	MT. COFFEE SUBSTATION	There are a few sensors used for testing and monitoring of equipment; some of the indication lights for those sensors are off/damaged.	Verify and repair the damage.	By November 21, 2025
8	MT. COFFEE SUBSTATION	A few Earth Switches in the switchyard have broken handles/blades.	Repair the damaged.	By November 21, 2025
9	MT. COFFEE SUBSTATION	Some ventilators installed in the control building are damaged.	Repair the damaged	By November 21, 2025
10	MT. COFFEE SUBSTATION	There is no switching instruction in the substation.	Make available a switching instruction.	By November 21, 2025
11	MT. COFFEE SUBSTATION	Absence of substation maintenance history/evidence or maintenance plan.	Ensure a maintenance plan is available at the substation.	By November 21, 2025
12	MT. COFFEE SUBSTATION	The substation has a register or logbook. However, it does not include records of the Power frequency, the power factor, and the reactive power.	Ensure the other data, such as frequency, power factor, and reactive power, are logged.	By November 21, 2025
13	MT. COFFEE SUBSTATION	The office and kitchen in the control building are unclean and are not equipped. Operators complained about the storage of the monthly water and tea supply.	Ensure a well-flushing bathroom is available, and have the kitchen reconditioned. Also, take care of the staff's tea or coffee.	By November 21, 2025

14	MT. COFFEE SUBSTATION	There is no light in the battery bank room.	Ensure lights are available.	By November 21, 2025
15	MT. COFFEE SUBSTATION	The Substation lacks janitorial staff; as a result, the bathroom and everywhere are unclean.	Get an assigned janitorial staff like the other substations.	By November 21, 2025
16	MT. COFFEE SUBSTATION	There are lots of millipedes (thousand legs) in the control room.	Use a proper treatment mechanism to get rid of the millipedes.	By November 21, 2025
17	MT. COFFEE SUBSTATION	There are no lights in the security booths at the control building and the spillway.	Ensure lights are available	By November 21, 2025
18	MT. COFFEE SUBSTATION	The station lacks security; due to the lack of manpower, the substation operates without security on Saturdays and Sundays.	Security should be available at all times.	By November 21, 2025
19	MT. COFFEE SUBSTATION	Spare materials are not properly stored; they are exposed to the rain and sun.	Store spare materials properly.	By November 21, 2025
20	MT. COFFEE SUBSTATION	Some staff members have not gotten first aid training.	Conduct first aid training	By November 21, 2025

APPENDIX R. Team Photos

Joint Team at Mt. Coffee

Team at NPA

Team at Bushrod