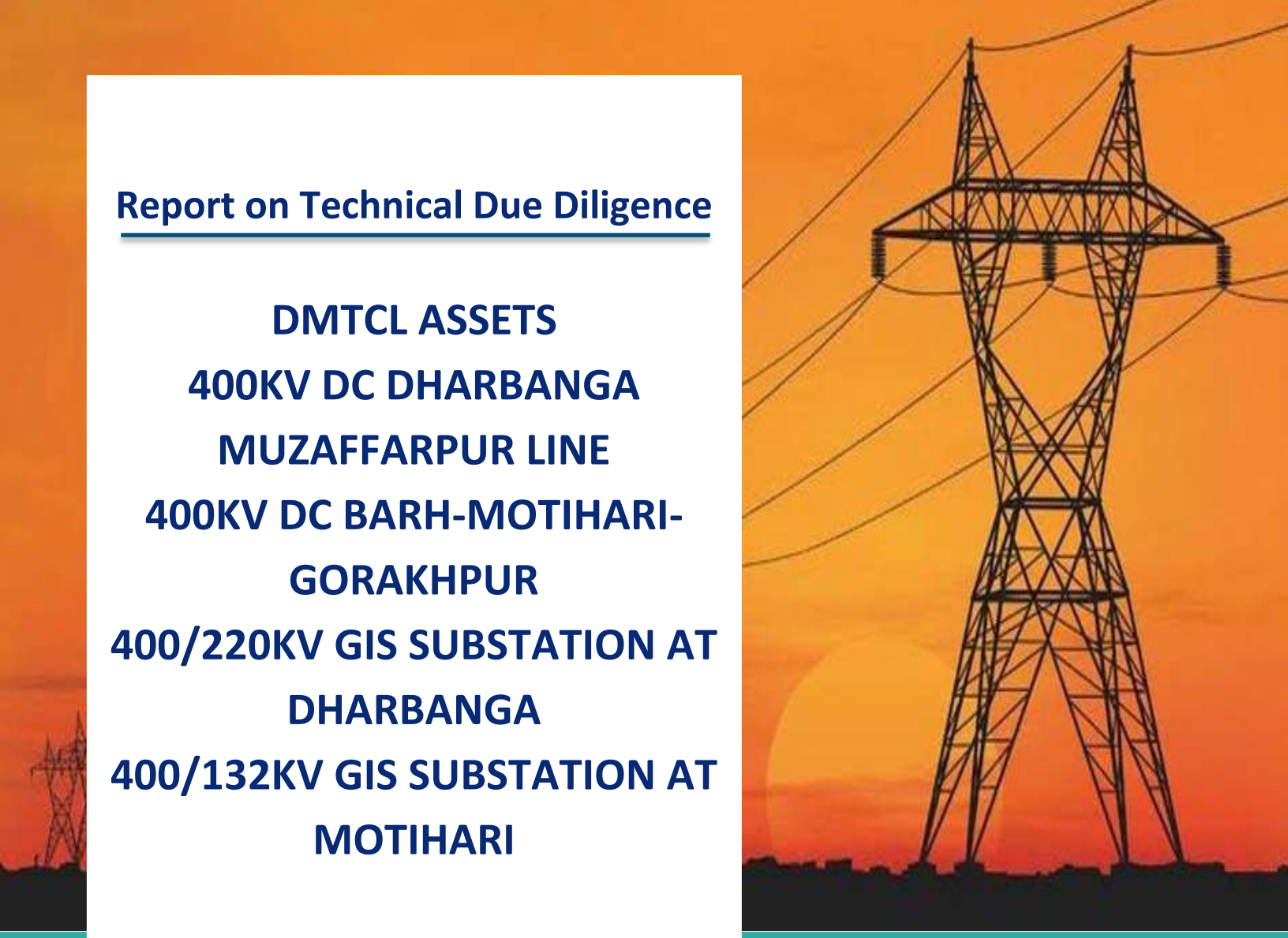

Report on Technical Due Diligence

DMTCL ASSETS
400KV DC DHARBANGA MUZAFFARPUR LINE
400KV DC BARH-MOTIHARI-GORAKHPUR
400/220KV GIS SUBSTATION AT DHARBANGA
400/132KV GIS SUBSTATION AT MOTIHARI

11 JULY 2022

SEKURA ENERGY PVT. LIMITED

TATA
TATA PROJECTS LIMITED

TATA PROJECTS LIMITED

TECHNICAL DUE DILIGENCE REPORT

Date of issue of report : 11th July' 2022

TATA PROJECTS LIMITED

TECHNICAL DUE DILIGENCE REPORT

REPORT SUBMITTED BY

TATA PROJECTS LIMITED

(QUALITY SERVICES DIVISION)

Report No. ***177763 -121121-1 Rev-6***

TPL Team

Mr. Sunil Hol

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The Report generated by TPL is based on the documents, data, information, details and facts provided by the client to the TPL in terms of the Contract during the site visit witnessed by the TPL. The Report furnished to the client is for the purpose of guidance to the Buyer based on the study carried out by the TPL to above referred documents / details made available to him by the client, who alone is responsible and liable for the authenticity and correctness of the referred documents / details as well as for any omissions and / or deletions of any nature whatsoever including data / details which could have been availed by the Seller from any third Party as a consequence of which and / or otherwise the TPL shall not in any way be held responsible or liable for any shortcomings, errors, acts of omissions / deletions of the said Report as well as for damages, claims, monetary losses, consequential losses etc. of any kind or nature whatsoever arising out of shortcomings, errors, omissions, mistakes in the Report and / or in documents, data, information, details and facts made available to the TPL by the Seller.

INDEX

Abbreviations

AC	:	Alternating Current
AAAC	:	All Aluminium Alloy Conductor
ACSR	:	Aluminium Conductor Steel Reinforced
AIS	:	Air Insulated Substation
BOOM	:	Build, Own, Operate & Maintain
BOQ	:	Bill of Quantity
BPC	:	Bid Process Coordinator
CBIP	:	Central Board of Irrigation & Power
CoD	:	Commercial Operation Date
Ckm	:	Circuit Kilometres
Ckt	:	Circuit
CEA	:	Central Electricity Authority
CERC	:	Central Electricity Regulatory Commission
CRP	:	Control Relay Panel
CT	:	Current Transformer
CTU	:	Central Transmission Utility
DB	:	Distribution Board
DC	:	Direct Current
D/C	:	Double Circuit
DDR	:	Due Diligence Report
Discom	:	Distribution Company
DG	:	Diesel Generator
DMTCL	:	Darbhanga Motihari Transmission Company Limited (DMTCL)
EHV	:	Extra High Voltage
EIL	:	Essel Infraprojects Limited
EPC	:	Engineering, Procurement & Construction
ER	:	Easter Region
ERLDC	:	Eastern Region Load Despatch Centre
ERSSS	:	Easter Region System Strengthening Scheme
FODP	:	Fibre Optic distribution Panel
FIPL	:	Feedback Infra Private Limited
FQP	:	Field Quality Plan
GI	:	Galvanized Iron
GIS	:	Gas Insulated Substation

GS	:	Galvanized Steel
HMI	:	Human Machine Interface
HT	:	High Tension
HV	:	High Voltage
ICT	:	Inter Connecting Transformer
IE	:	Independent Engineer
IEC	:	International Electro-Technical Commission
IEGC	:	Indian Electricity Grid Code
IS	:	Indian Standard
ISTS	:	Inter State Transmission System
kA	:	Kilo Ampere
kM	:	Kilometres
kN	:	Kilo Newton
kV	:	Kilo Volt
LTTC	:	Long Term Transmission Customer
LE	:	Lender's Engineer
LILO	:	line in – Line out
LT	:	Low Tension
LOA	:	Letter of Award
MS	:	Mild Steel
MQP	:	Manufacturing Quality Plan
MV	:	Medium Voltage
MVA	:	Mega Volt Ampere
MW	:	Mega Watt
NH	:	National Highway
NER	:	North Eastern Region
NR	:	Northern Region
NTPC	:	National Thermal Power Corporation Limited
OD	:	Overall Diameter
OEM	:	Original Equipment Manufacturer
OLTC	:	On Load Tap Changer
O & M	:	Operation & Maintenance
OPGW	:	Optical Fibre Ground Wire
PT	:	Potential Transformer
P&T	:	Post & Telegraph

PDC	:	Phase Data Concentrator
PGCIL	:	Power Grid Corporation of India Ltd.
PIIPL	:	Pan India Infraprojects Private Limited
PLCC	:	Power Line Carrier Communication
PMU	:	Phase Measurement Unit
POSOCO	:	Power System Operation Corporation Limited
PTCC	:	Power & Telecommunication Coordination Committee Clearance
PTW	:	Permit To Work
RFQ	:	Request for Quotation
RLDC	:	Regional Load Despatch Cell
RoW	:	Right of Way
RTU	:	Remote Terminal Unit
SAS	:	Substation Automation System
SCADA	:	Supervisory Controls & Data Acquisition System
SCOD	:	Scheduled Commercial Operation Date
SH	:	State Highway
SLDC	:	State Load Despatch Cell
SPV	:	Special Purpose Vehicle
SR	:	Southern Region
SS	:	Substation
STU	:	State Transmission Utility
TPL	:	TATA Projects Limited
TSA	:	Transmission Service Agreement
TSP	:	Transmission Service Provider
UPS	:	Uninterrupted Power Supply
UTS	:	Ultimate Tensile Strength
VEPL	:	Virtuous Energy Private Limited
VRLA	:	Valve Regulated Lead Acid.

1.0 EXECUTIVE SUMMARY:

Background:

Transmission is a vital element of the power sector value chain. A well-developed transmission network helps in efficient evacuation of electricity from generating stations for transmission to the load centers. The transmission system in India is predominantly categorized into voltage levels of 220 kV, 400 kV, 765 kV in AC system and 320 kV, 500 kV and 800 kV in DC system. As per statistics by the Central Electricity Authority (CEA), India has a cumulative transmission line length of 4,48,407 ckt km_1 and a cumulative substation capacity of 10,59,391 MVA_2 as of September 2021. Growing power demand, Government's focus on improving the distribution sector- the last mile in power sector, addition of RE capacity and adoption of new technologies to address challenges linked to RE integration, are likely to drive growth of power transmission in India.

In India, the transmission system is a two-tier structure comprising intra-state grids and inter-state transmission system grids. Historically, transmission system was developed by Central and State level utilities. As per the provisions under Section 63 of the Electricity Act, 2003 and the Tariff Policy dated 6th January 2006, the Ministry of Power (MoP) issued "Guidelines for Encouraging Competition in Development of Transmission Projects" and Tariff Based Competitive Bidding Guidelines for Transmission Services" (the "Guidelines"). These Guidelines laid down a transparent procedure for facilitating competition in the transmission sector and paved a way for wide participation in providing transmission services and tariff determination through a process of tariff based competitive bidding.

Subsequent to the above referred guidelines, the MoP has also issued standard bidding documents such as request for qualification ("RFQ"), request for proposal ("RFP"), transmission service agreements and also appointed PFC Consulting Limited (PFC) and REC Transmission Projects Company Limited as the bid process coordinators for carrying out the bidding process.

PFC, acting as the BPC, issued a RFQ dated February 08, 2013, for the purpose of selection of Bidder as Transmission Service Provider (TSP) to establish Transmission System for "Eastern Region System Strengthening Scheme – VI" through tariff based competitive bidding (TBCB). Darbhanga Motihari Transmission Company Limited (DMTCL) was incorporated by PFC as the SPV for setting up the proposed Transmission project and subsequently act as the Transmission Service Provider (TSP). In the bid process conducted for the same, Essel Infraprojects Ltd (EIL) emerged as the successful bidder and acquired DMTCL for developing the proposed transmission project on a build own operate and maintain (BOOM) basis.

DMTCL established the Transmission System comprising the following elements.

[1] GS_TL.pdf (cea.nic.in)

[2] GS_SS.pdf (cea.nic.in)

a) Transmission Elements viz.
   i. 400 kV D/C Line between Darbhanga – Muzaffarpur of about 62.843 kms length,
   ii. 400 KV DC LILO (line in – Line out) Line of Barh – Gorakhpur connecting at Motihari,
      a) 400 kV D/C Barh – Motihari quad route length 37.534 kms.
      b) 400 kV D/C Barh – Motihari quad route length 38.188 kms

b) Substation Elements viz.
   i. 2 x 500 MVA, 400/220 kV GIS Substation at Darbhanga and
   ii. 2 x 200 MVA, 400/132 kV GIS Substation at Motihari.

In addition to the above the Project also has following Reactors:

a. 2X80MVAR Line Reactors (Switchable) and 2X50MVAR Line Reactors (Fixed) for Barh-Motihari and Motihari-Gorakhpur Sections at Motihari
b. 2X125 MVAR Bus Reactors at Darbhanga & Motihari Substations each

In May 2019, DMTCL was acquired by Sekura Energy Pvt. Limited (SEPL), a Portfolio Company of Edelweiss Infrastructure Yield Plus Fund. Since then, SEPL has been managing DMTCL and carrying out the operation & maintenance of all the elements of DMTCL. Over the past years, DMTCL has managed to secure an average annual system availability of more than 99.75 %, which is well beyond the stipulated normative availability of 98%.

Technical Due Diligence Study:

SEPL presently envisage to float an Infrastructure Investment Trust (“InvIT”) and proposes to undertake a transfer of its ownership in DMTCL to the proposed InvIT. In this context, SEPL wishes to carry out an independent third-party assessment of the Transmission Asset of DMTCL. SEPL through DMTCL has appointed TATA PROJECTS LIMITED (IE) to undertake the independent third-party assessment. This report elaborates the tasks carried out by the IE as part of the Due Diligence and records its observations and findings. The scope of the engagement and activities carried out by the IE have been detailed out in this report.

Summary of Findings

Based on above study carried out, it is observed that the project established is compliant to all technical, statutory, regulatory requirements and being operated & maintained with highest technical standards by competent personnel in line with all the guideline provided by regulatory authorities and best prudent industrial practices.

The detailed findings of the study have been captured in chapter [17] of this Report.

2.0 ABOUT DMTCL PROJECT:

2.1 Significance of the Project

During the envisage time of the project the state of Bihar projected a future demand of about 5600 MW by the year FY 2016-17. Out of this, about 2100 MW power demand was envisaged in the Northern part and about 3500MW power demand in the Southern part of the state. Regarding power availability during the said period, Bihar would have additional share of about 3000 MW from Central Generating Stations (e.g., NTPC Barh-I&II, Nabinagar-I&II, Tilaiyya UMPP). In addition, more generation capacity was planned under the state and private sector which were expected to come up in the next 5-6 years.

Northern part of Bihar had only 2 nos. of 400kV sub-stations (Purnea & Muzaffarpur) with total capacity of 1260MVA as against projected demand of about 2100 MW in 2016-17. Keeping in view the load growth requirement, 2 nos. 400kV ISTS sub-station viz. a) 400/220 kV Substation at Darbhanga and b) 400/132 kV Substation at Motihari, along with associated transmission lines were planned to be established in North Bihar. These projects (later developed under the SPV - DMTCL), were significant to strengthen transmission system in the region.

2.2 Tender process and Award of Project

The Government of India, Ministry of Power, vide Gazette Notification dated October 08, 2012 had notified PFC Consulting Limited to be the Bid Process Coordinator (BPC) for the purpose of selection of Bidder as Transmission Service Provider (TSP) to establish transmission system for “Eastern Region System Strengthening Scheme-VI” through tariff based competitive bidding process (TBCB). PFC, acting as the Bid Process Coordinator (BPC), issued a RFQ dated February 08, 2013 and subsequently issued RFP on May 27, 2013. Darbhanga Motihari Transmission Company Limited (DMTCL) was incorporated by PFC as the SPV for setting up the proposed Transmission project and subsequently act as the Transmission Service Provider (TSP). In the bid process conducted for the same, Essel Infraprojects Ltd (EIL) emerged as the successful bidder and acquired DMTCL for developing the proposed transmission project on a build own operate and maintain (BOOM) basis. The Letter of Intent (LOI) had been issued by the BPC to the EIL on October 17, 2013. (DMTCL Assets were later acquired by Sekura Energy Limited (SEPL), a Portfolio Company of Edelweiss Infrastructure Yield Plus in May 2019).

2.3 Transmission Service Agreement

DMTCL has eight Long-Term Transmission Customers (LTTCs) which are the beneficiaries of the project. A Transmission Service Agreement (TSA) was executed on August 06, 2013 between the DMTCL and LTTCs for procurement of Transmission services and for development of concerned Transmission Assets. The list of LTTCs of DMTCL is as following.

Table 1: List of LTTCs of DMTCL

LONG TERM TRANSMISSION CUSTOMER (LTTC) LIST		
Sl. No.	**Customer / DISCOM Details**	**% Share of each LTTC**
1	Maithon Power Limited	4.875
2	Grid Corporation of Orissa	20
3	**Bihar State Electricity Board**	**31.87**
4	Power Grid Corporation of India Limited, HVDC Pasauli	0.023
5	Damodar Valley Corporation, Kolkata	8.43
6	Energy & Power Department, Govt. of Sikkim	2.551
7	Jharkhand State Electricity Board	8.105
8	West Bengal State Electricity Distribution Company Limited	24.146
		100

Further, a Supplementary TSA was executed on August 08, 2016 between DMTCL and Central Transmission Utility. The said Supplementary Agreement was signed pursuant to the Central Electricity Regulatory Commission (Sharing of Inter-State Transmission Charges and Losses), Regulations 2010 to govern the provision of inter-State Transmission services including sharing of transmission charges and losses amongst the ISTS Customers (termed as 'Designated ISTS Customers or DICs) and disbursing the transmission charges collected by the CTU to respective ISTS Licensees. The terms of the TSA will be effective for a period of 35 years commencing from the date of Scheduled COD.

2.4 Transmission Licence

Transmission business is identified as a Licensed activity under Section 14 of the Electricity Act 2003. DMTCL was granted transmission Licence by CERC vide order dated 30.05.2014. The present Licence is valid for an initial period of 25 years with provision of extension of Licence period for another term.

2.5 Key Statutory Clearance

DMTCL had received all necessary Statutory Clearance required for setting up and operation of the Transmission Asset. Major clearances including a) Approval under Section 68 of the Electricity Act, b) Authorization under Section 164 of the Electricity Act c) Grant of Transmission License by CERC, d) Route approval by PTCC, GOI e) Electricity Safety Clearance of CEA, etc., is observed to have been obtained and in place by DMTCL. The detail list of clearances has been covered in section 15 of this report.

2.6 Award of EPC Contractor

DMTCL had executed an EPC Contract with M/s. Pan India Infra Projects Private Limited (PIIPL) on 4th March 2014 for execution of the entire transmission lines and substations. The scope of work of the EPC contractor included supply, erection, civil work, Row clearances and all relevant works for execution of entire project. The Effective date of EPC Contract between DMTCL and Pan India Infra projects Pvt Limited (PIIPL) is 4th March 2014.

2.7 Project Elements and Commissioning Date

The details of Project Elements along with the Commercial Operation Dates of the Project are as follows:

Table 2: Elements of DMTCL and COD

Sr. No.	Transmission System for "Eastern Region System Strengthening Scheme – VI" (DMTCL)	
	Name of the Transmission Element	**Commercial Operation Date (COD)****
1	a) 2x500 MVA, 400/220 kV GIS Substation at Darbhanga with	31st March 2017
	400kV Line bays – 2 Nos.	
	400 kV ICT bays – 2 Nos.	
	220kV Line bays – 7 Nos.	
	220 kV ICT bays – 2 Nos.	
	Space for Future bays – 7 Nos. 400kV and 6 Nos. 220 kV	
	125 MVAR Bus Reactors – 2 Nos.	
	Bus reactor bays – 2 Nos.	
	b) Muzaffarpur (PGCIL Substation) - Darbhanga 400 kV D/C line with triple snowbird ACSR conductor.	
2	a) 2x200 MVA, 400/132 kV GIS Substation at Motihari	10th Aug 2017
	400kV Line bays – 4 Nos.	
	400kV ICT bays – 2 Nos.	
	132kV Line bays – 6 Nos.	
	132kV ICT bays – 2 Nos.	
	Space for Future bays - 5 Nos. 400kV and 5 Nos. 132 kV	
	125 MVAR Bus Reactors – 2 Nos.	
	Bus reactor bays – 2 Nos.	
	b) LILO of 400 KV DC Barh – Gorakhpur Line (400 KV DC Quad AAAC Moose Barh – Motihari Line & Motihari – Gorakhpur Line)	

Sr. No.	Transmission System for "Eastern Region System Strengthening Scheme – VI" (DMTCL)	
	c) 2x80 MVAR Line Reactors (Switchable) at Motihari end (with 600 Ohm NGR) for Barh-Motihari section.	
	d) 2x50 MVAR Line Reactors (fixed) at Motihari end (with 400 Ohm NGR) for Motihari-Gorakhpur section.	

2.8 Status of the project:

The project is currently commissioned and operational since actual date of COD:

- At Darbhanga Substation, 400kV and 220kV GIS Bays are commissioned. The 220kV Cables for North Bihar Power Distribution Company Limited (NBPDCL) Line Bays are installed.
- At Motihari Substation, 400kV and 132kV GIS Bays are commissioned. The 132kV Cables for Line Bays are installed.
- There are 178 numbers of towers for Muzaffarpur – Darbhanga line. The Line Length is 62.843 km.
- There are 204 numbers of towers for LILO Transmission Lines at Motihari. The Line Length is 75.3 Kms.

The details of various approvals received by the project related to its commissioning are as follows:

2.8.1 Commissioning details of Darbhanga Element:

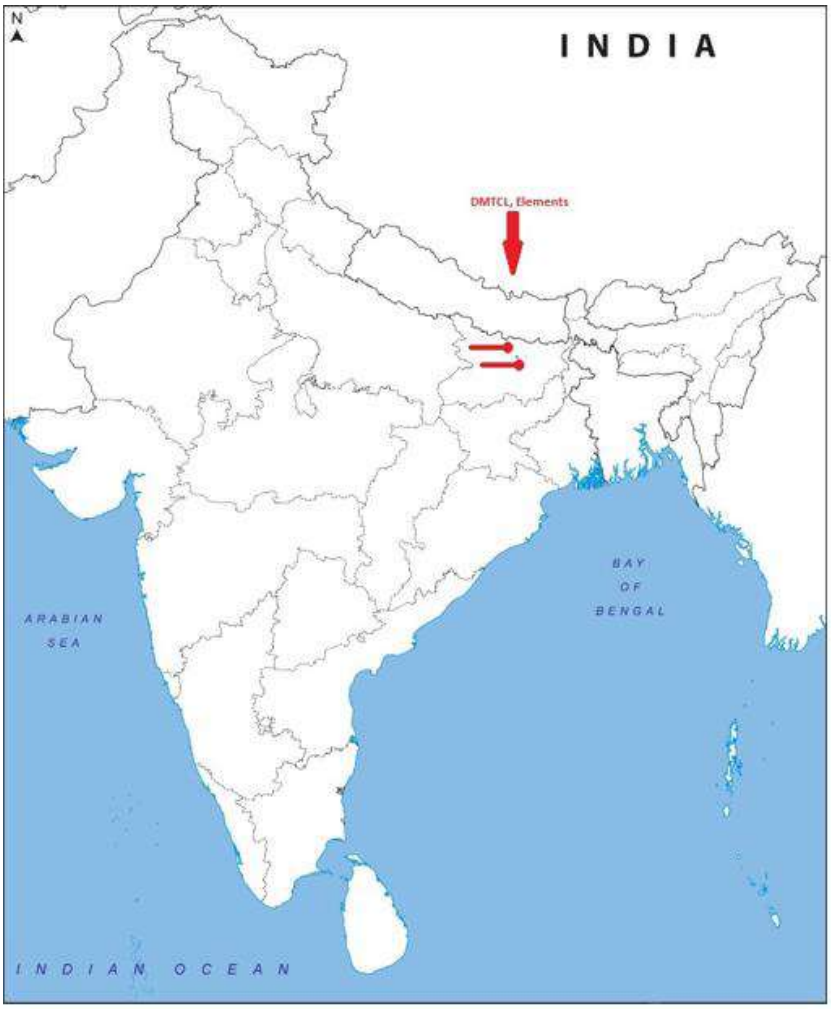
- Approval for Energization by CEA issued on 29.03.2017
- Deemed COD declared by DMTCL on 31.03.2017
- Completion Certificate issued by DMTCL to PIIPL on 03.04.2017
- Certificate of Completion of Trial operation of Transmission Element issued on 09.06.2017 by POSOCO.

2.8.2 Commissioning details of Motihari Element:

- Approval for Energization by CEA issued for Transmission line on 26.07.2017.
- Approval for Energization by CEA issued for Substation on 26.08.2017
- COD declared by DMTCL on 10.08.2017
- Completion Certificate issued by DMTCL to PIIPL on 14.08.2017
- Certificate of Completion of Trial operation of Transmission Element issued on 26.09.2017 by POSOCO

The following diagram shows the project location of DMTCL plotted on the map.

Figure 1: DMTCL Project Location



3.0 OBJECTIVE & SCOPE OF TPL'S SERVICES

SEPL, which presently owns DMTCL envisage to float an Infrastructure Investment Trusts ("InvIT") and proposes to undertake a transfer of its ownership in DMTCL to the proposed InvIT. In this context, SEPL wishes to re-evaluate existing conditions of the Transmission Asset of DMTCL and undertake a Technical Due Diligence exercise. TATA PROJECTS LIMITED (TPL) was appointed as Independent Engineer (IE) to undertake the said Technical Due Diligence of DMTCL and to assess the existing condition of the asset. The scope of the engagement and activities carried out by the IE are as following.

3.1 Agreed Scope of work:

The scope of work for the IE identified are as following:

- To review statutory approvals for compliance from a technical perspective.
- To visit the Project site for review and verification of various technical aspects and compliance to conditions in approvals, if required.
- To review the documents pertaining to following and report accordingly:
    1. Overall Project Status
    2. Project Design
    3. Transmission Licence
    4. Communication System
    5. Environment and Safety
    6. Quality Control
    7. Operation and Maintenance
    8. Availability of DMTCL
    9. Spare Parts Management
    10. Physical Security of Assets
    11. Cyber Security
    12. Risk Analysis
    13. Regulatory Aspects
    14. Insurance
    15. Conclusion

3.2 Services Methodology Adopted

- Off-site review of documents.
- Reporting.

This report covers the Technical assessment of the DMTCL project comprising of 400 kV D/C Transmission System and Substations (ERSSS-VI) in Bihar which is commissioned & operational since 2017.

As a part of this exercise, IE has conducted a review of the existing project documents/Contracts, best practices, processes and has identified the risk factors involved for operating asset's lifecycle. IE has categorized these issues into different Risk Categories, details of which are elaborated in the subsequent sections.

4.0 REVIEW OF PROJECT DOCUMENTS - TRANSMISSION LINES & SUBSTATIONS

The IE has identified the list of documents for review to carry out technical due diligence and all the documents were provided by DMTCL for the Transmission lines and Substations. The list of project documents reviewed as part of the due diligence are as follows:

a. EPC contracts/Sub-Contracts
b. Transmission Service agreement
c. Share Purchase Agreement
d. Statutory clearance documents
e. Regulatory documents
f. Organisation structure documents
g. Insurance Documents
h. COD documents
i. O&M SOP and documents.
j. Drawings & Guaranteed Technical Parameters (GTP) of major equipment etc.

Based on documents provided the IE has examined/reviewed the documents in respect of their validity corresponding to relevant technical specification based on which Transmission system were constructed, Country's prevalent standards including CEA & CBIP norms and the equipment/materials used were tested/ validated with respect to Specification and Standards.

IE observed the technical parameters adopted by the Project Company are as per Specifications & Standards for the Transmission system laid down in the Transmission Agreement as well as the relevant Indian/ International Standards different IS Codes, CBIP Manual, CEA guidelines etc and are suitable for use on 400 kV Transmission Systems.

It is observed that all the documents are available for the above project are in line with relevant standards, approved by reputed technical consultant and approval/clearances achieved from the competent authorities as applicable.

4.1 Review of Project Contracts

4.1.1 EPC Contract

The complete Project has been implemented on EPC Contract basis. The Project Company has awarded the EPC Contract to M/s. Pan India Infraprojects Private Limited (PIIPL) for Supply, Services & Civil Works of the Project. A brief summary of the finalized EPC Contract is given in Table below.

Table 3: Brief Summary of EPC Contract

Scope of Work	Details
Supply Agreement Between DMTCL and PIIPL	**FOR TRANSMISSION LINE** Design, Testing, Fabrication and Supply of all Equipment (including extensions and accessories), including supply of: i. Towers, Tower Accessories, ii. Earth Wire, Conductor, OPGW, Insulators, Hardware Fittings and Accessories for Conductor, EarthWire and OPGW. **FOR SUBSTATIONS** All equipment & material required for construction of 400kV/220kV GIS Substation including Outdoor equipment at Darbhanga and 400/132kV GIS Substation at Motihari.
Service Agreement Between DMTCL and PIIPL	**FOR TRANSMISSION LINE** a. Detailed Survey, Soil Investigation, Profiling and Check Survey b. Erection of Towers with Accessories c. Stringing of Conductors, Earth Wire and OPGW d. Earthing of Towers e. Tack Welding f. Tree cutting g. Final checking h. Testing, Commissioning and handing over i. Right of Way (RoW) j. Crossings etc. k. To prepare and submit the proposals along with all requisite documents and drawings for all statutory clearances. **FOR SUBSTATIONS** Erection of all equipment & material required for 400kV/220kV GIS Substation including Outdoor equipment at Darbhanga and 400/132kV GIS Substation at Motihari, Including Detailed Survey, Soil Investigation, design, engineering, manufacture, testing, supply on FOR destination site basis, including transportation and insurance.

Scope of Work	Details
Civil Works Agreement Between DMTCL and PIIPL	**FOR TRANSMISSION LINE** All associated Civil Works for Tower foundations casting including excavation, stub setting, concreting along with special foundations. **FOR SUBSTATIONS** All associated Civil Works for construction of 400kV/220kV GIS Substation at Darbhanga and400/132kV GIS Substation at Motihari. such as earthwork excavation, land levelling & development, cement and reinforcement steel anti-termite treatment, boundary wall earthing, fencing, control room & GIS Building works, roads, drainage, sewerage, painting, gates, trench, foundation casting with all material /equipment's required for casting etc

4.1.2 Contract for Owner's Engineer

DMTCL had appointed M/s Feedback Infra Private Limited (FIPL) as the Owner's Engineer. All Design and Engineering of the entire Transmission System and substation including design of Towers and foundations have been approved by the Owner's Engineer before submitting for final approval to DMTCL.

4.1.3 Contract for PMC

PIIPL had appointed M/s Virtuous Energy Private Limited (VEPL) as Project Management Consultant. DMTCL informed the IE that the Company VEPL has adopted well established mechanism for Quality Assurance, Inspections and Testing, Site supervision, Progress monitoring and Safety aspects to achieve projects goals.

4.1.4 Warranty Period / Defect Liability Period

As per the Contract, the Contractor warrants that the works shall meet the Specifications and Standards. If during the Defect Liability Period, any defect is discovered in the Works or part thereof; or the Works or any part thereof fails to meet the Specifications and Standards, the Employer will notify the Contractor of such defects or failure. Upon receipt of such notice, the Contractor shall promptly repair or replace such Work in accordance with this Agreement, Good Industry Practices and Applicable Laws. Defect Liability Period shall be for a period of 12 months calculated from the date of issuance of the Completion Certificate or 12 months from rectification of defects, whichever is later. The Final Completion/Acceptance Certificate been issued for the Darbhanga Element on 03.04.2017 and 14.08.2017 for the Motihari Element. The defect liability period is over for the Darbhanga Element and Motihari Element.
IE found the Warranty Period/Defect Liability Period Clause in order and generally in line with similar Contracts for other Transmission Projects being executed in the country.

4.2 Transmission Lines - Design & Supply

Below are the details of the Project transmission line elements along with the suppliers of different items used in the Project,

Name of TL- Muzaffarpur- Darbhanga Transmission Line Section	
400kV Double Circuit Darbhanga – Muzaffarpur Line with ACSR Triple Snowbird Conductor:	
· Contractor	M/s Unitech Power Transmission Limited (UPTL)
· ACSR Triple Snowbird Conductor: Supplier-	Sterlite Technologies Limited
· Composite Rod Insulators 120 KN & 210 KN	Supplier- Jiangsu Xiangyuan Electric Equipment Co. Ltd.
· ACSR Hardware & Accessories	Tag Corporation
· OPGW Cable	Supplier-ZTT India Pvt Ltd.
· Tower Material Supplier	Unitech Power Transmission Ltd.

Name of TL- Motihari LILO 400 kV D/C Line Quad Moose	
· LILO of 400 kV D/C Barh – Gorakhpur at Motihari (Barh – Motihari & Motihari – Gorakhpur Quad Moose Lines)	
· Contractor	Jyoti Structures Ltd.
· AAAC MOOSE Conductor	JSK Industries Pvt.. Ltd.
· Composite Rod Insulators 120 KN & 160 KN	Supplier- Jiangsu Xiangyuan Electric Equipment Co. Ltd.
· ACSR Hardware & Accessories	Tag Corporation
· OPGW Cable	Sterlite Technologies Limited
· Tower Material Supplier	Jyoti Structures Ltd.

4.2.1 Transmission Line, Towers & Accessories

The Double Circuit 400kV Transmission system has towers with vertical conductor configuration. The towers are self-supporting hot dip galvanized lattice type with bolted structural members, designed to carry the line conductors with insulators, earth wires and fittings under all loading conditions. The tower structural members are fully galvanized using mild steel/ high tensile steel sections. Bolts and nuts are provided with spring washers.

In general, Transmission Systems in India adopt the guidelines laid down in CBIP Transmission Line Manual while finalizing the types of Transmission Towers. Different tower types with Deviation Limits is given below in Table.

Table 4: Different Tower types & deviation limit

Tower Type	Deviation Limit	Defined Use
DA	0 deg – 2 deg	To be used on straight runs and up to 2º line deviation.
DB	0 deg - 15 deg	Small Angle tower with tension insulator string. To be used for line deviation from 0 to 15 degree.
DC	15 deg - 30 deg	Medium angle tower with tension insulator string. To be used for line deviation from 15 to 30 degree.
DD	30 deg - 60 deg	Large Angle and Dead End Tower with Tension Insulator string. To be used for line deviation from 30 to 60 degree.

In DMTCL, lattice steel towers of DA, DC & DD type has been used as per IS 802 for the relevant wind zone along with the applicable adequate Reliability level. All the tower parts, stubs and pack washers are hot dip galvanized with minimum overall zinc coating as per the relevant IS code provision.

The Double Circuit 400kV Transmission system has towers with vertical conductor configuration. DMTCL has furnished the Tower Schedules showing the type of towers. The exact type of towers for the 400 kV System along with the number of each type of tower as well as details of extensions has been furnished in Tower Schedule. The design drawings/documents and type test reports of DA, DC and DD type towers were verified by Independent Engineer (TPL). The same were generally found to be in order. Also, the Substation drawings, layouts, documents were verified by IE and generally found to be in order.

4.2.2 Line Accessories:

Insulators:

The design parameters of the insulators / Insulator strings for the project in Darbhanga – Muzaffarpur line with ACSR Triple Snowbird conductor & Lilo line with AAAC Quad Moose conductor are as below

Table 5: Design parameters of Insulator Strings

Type of String	Min. Creepage Distance (mm) Per Unit	Electro – Mechanical strength of Single Long Rod Insulator Unit (kN)	Mechanical Strength of Insulator String along with Hardware Fittings (kN)
Double 'I' Suspension.	13020	120	2X120

Single "I" Suspension 'Pilot' in DB, DC & DDTowers	13020	120	1X120
Double Tension Insulator String for DB,DC & DD Towers	13020	210	2X210
Single "I" Suspension 'Pilot' in DB, DC & DD Towers	13020	120	1X120
Double "I" Suspension In DA Tower	13020	120	2X120
Quad Tension Insulator String for DB, DC & DD Towers	13020	160	4X160

Mid span compression joint for conductor/ earth wire:

Mid span compression joints suitable for conductor/ earth wires have been used for joining two lengths of conductor/ earth wires. The minimum slipping strength of the joint after compression is not less than 95% of UTS of conductor/earth wire.

Repair sleeve for conductor:

Repair sleeve to be used only for repairing conductor with not more than two strands broken in the outer layer. The sleeve is manufactured from 99.5% pure aluminium and shall have a smooth surface. It comprises of two pieces with provision of seat forsliding of the keeper piece.

Flexible copper bond for earth wire:

Flexible copper bonds are used for good electrical continuity between the earth wire and the tower. Two bonds per suspension tower and four bonds per tension tower is used.

Vibration dampers for conductor/ earth wire:

Stockbridge vibration dampers are used to reduce the maximum dynamic strain caused by Aeolian vibrations to a value of 150 micro-strains.

Spacers/ Rigid Spacer

Armour grip bundle spacer with retaining rods have been used for the line to maintain a sub - conductor spacing of 450 mm under all working conditions. Rigid spacer for jumper are used at all tension towers

B) Design Review of Fasteners, Insulator and other hardware material used in Towers

Drawings of Conductor, Earth wire, OPGW, Insulators, H/W and Conductor/EW/OPGW accessories were found to be as per technical specifications and meeting the Indian standards.

C) Confirm compliance of technical requirements of Tender & Final contract and its Amendments.

IE observed the technical parameters adopted by the Project Company are as per Specifications & Standards for the Transmission system laid down in theTransmission Agreement as well as the relevant Indian/ International Standards and are suitable for use on 400 kV Transmission Systems.

D) Statutory Clearances:

Forest clearances, NH clearances, Railway clearances, PTCC clearances, Air Port Authority clearances have been verified and detailed in the report at section 15.2.

In view of the above, it may be seen that the Transmission systems under review are constructed following the technical specification and country's latest standards. Further these Transmission System are under operation for last few years which proves its operational viability, stability and healthiness.

4.3 Substations – Design & Supply

Project has developed 400/220KV & 400/132KV GIS Substations at Darbhanga & Motihari respectively. The Technical details of the Substations are as under: -

4.3.1 Salient features of 400 kV, 220 kV & 132 kV GIS Substation equipment and facilities

The two (2) Substations at Darbhanga & Motihari are Gas Insulated type generally conforming to the requirement of CEA regulation for construction of Substation.

4.3.2 400/220 kV Substation at Darbhanga

In view the location of existing 400kV Substations (Purnia & Muzaffarpur) in North Bihar, it was planned to establish one 400kV Substation at Darbhanga in between Purnia and Muzaffarpur. The Darbhanga substation was planned to cater to the power demand of the region with following elements:

- 400/220 kV GIS Substation at Darbhanga has One & Half breaker scheme on 400kv Bus and Double Main scheme on 220kv Bus. It has following elements: -

(i) 500 MVA, 400/220KV ICT – 2 Nos.

(i) 125 MVAR Bus Reactors – 2Nos.

(ii) 400kV Line bays – 2 Nos.

(iii) 400 kV ICT bays – 2 Nos.

(iv) 220kV Line bays – 7 Nos.

(v) 220 kV ICT bays – 2 Nos.

(vi) 400KV Bus reactor bays – 2 Nos.

All major equipment's of Darbhanga Substation are designed, procured & installed by TBEA Energy (India) Pvt. Ltd on EPC basis as per the contract awarded by PIIPL and is connected to existing Muzaffarpur Substation of PGCIL through 400kV high-capacity D/C line. The details of major equipment and respective OEM are as under:

Table 6: Details for major equipment & OEMs - Darbhanga

Sr. No.	Equipment	Supplier
1	400KV & 220KV GIS Substation Equipment	TBEA Zonfa Pvt. Ltd, China
2	500MVA Power Transformers (ICT-1 & ICT-2)	TBEA Energy (India) Pvt. Ltd
3	125MVAR Bus Reactor-1 & 2	TBEA Energy (India) Pvt. Ltd
4	220 KV EHV cables	TBEA – Shandong, China
5	220 kV Indoor & outdoor EHV cable termination kits	PFISTERER, Germany.
6	420kV & 245kV Capacitor Voltage Transformers/Voltage Transformers	Siemens Limited, India
7	Control and Relay Panels	Siemens Limited, India
8	PLCC & FOTE	ABB India Limited.
9	Substation Automation System	Siemens Limited
10	Surge Arresters	Crompton Greaves Limited
11	400KV & 220KV Wave Trap	Beijing Power Limited & GE T & D Ltd.
12	630 KVA,33/0.433 KV Transformer	TBEA Energy (India) Pvt. Ltd
13	250kVA DG Set	Crompton Greaves Limited

Sr. No.	Equipment	Supplier
14	220V DC System comprising of 2x100% FCBC with 2x100% VRLA Dry Cell Battery with DCDB.	Amaraja Batteries.
15	48V DC System comprising of 2x100% FCBC with 2x100% VRLA Dry Cell Battery with DCDB.	Amaraja Batteries.
16	LT Panels & ACDB Panels.	Nithya Switchgears
17	Fire fighting system	Technico (India) Pvt Ltd.

4.3.3 400/132 kV Substation at Motihari:

400/132kV Substation Motihari has been built-up in between Muzaffarpur and Gorakhpur. The Substation has One & Half breaker scheme on 400kv Bus and Double Main scheme on 132 kv Bus. It has following elements 2x200 MVA, 400/132 kV GIS Substation at Motihari: -

(i) 200 MVA, 400/132KV ICT – 02 Nos

(ii) 125 MVAR Bus Reactors – 02 Nos.

(iii) 80 MVAR Line Reactors – 02 Nos.

(iv) 50 MVAR Line Reactor – 02 Nos.

(v) 400kV Line bays – 4 Nos.

(vi) 400kV ICT bays – 2 Nos.

(vii) 400KV Bus reactor bays – 2 Nos

(viii) 400KV Switchable line reactor Bay – 02 Nos.

(ix) 132kV Line bays – 6 Nos.

(x) 132kV ICT bays – 2 Nos.

Similar to Darbhanga all major equipment of Motihari Substation are designed, procured & installed by TBEA Energy (India) Pvt. Ltd on EPC basis as per the contract awarded by PIIPL and is connected to existing Muzaffarpur Substation of PGCIL through 400kV high-capacity D/C line. The details of major equipment and respective OEM are as under,

Table 7: Details for major equipment & OEMs - Motihari

Sr. No.	Equipment	Supplier
1	400KV & 132KV GIS Substation Equipment	TBEA Zonfa Pvt. Ltd, China

Sr. No.	Equipment	Supplier
2	200MVA Power Transformers (ICT-1 & ICT-2)	TBEA Energy (India) Pvt. Ltd
3	125MVAR Bus Reactor-1 & 2	TBEA Energy (India) Pvt. Ltd
4	80MVAR Line Reactor 1 & 2	TBEA Energy (India) Pvt. Ltd
5	50MVAR Line Reactor 1 & 2	TBEA Energy (India) Pvt. Ltd
6	132 KV EHV cables	TBEA – Shandong, China
7	132 kV Indoor & outdoor EHV cable termination kits	PFISTERER, Germany.
8	420kV & 145kV Capacitor Voltage Transformers/Voltage Transformers	Siemens Limited
9	Control and Relay Panels	Siemens Limited
10	PLCC & FOTE	ABB India Limited & COMTEL.
11	Substation Automation System	Siemens Limited
12	Surge Arresters	Crompton Greaves Limited
13	400KV Wave Trap	Beijing Power Limited
14	630 KVA,33/0.433 KV Transformer	TBEA Energy (India) Pvt. Ltd
15	250kVA DG Set	Crompton Greaves Limited
16	220V DC System comprising of 2x100% FCBC with 2x100% VRLA Dry Cell Battery with DCDB.	Amaraja Batteries.
17	48V DC System comprising of 2x100% FCBC with 2x100% VRLA Dry Cell Battery with DCDB.	Amaraja Batteries.
18	LT Panels & ACDB Panels.	Nithya Switchgears
19	Fire fighting system	3D fire system Pvt Ltd.

A) Compliance of Tender Technical requirements for all substation equipment

The Switchyard equipment including transformers have been supplied by reputed manufactures of India i.e. TBEA Energy (India) Pvt. Ltd. All Technical Parameters of the major Equipment i.e. Insulation level, Current rating, Corona Extinction, Maximum Radio interference voltage, closing & opening time of circuit breakers, creepage distance, percentage impedance & tap range and OLTC rating of the transformer, Short ckt. current withstand, Seismic acceleration, partial discharge for LAs & CVTs etc. found to be meeting standard specification & IEC/IS.

This Substations are automated with segregated architecture i.e. Bay Control units and protection panels have been placed in respective Bay Kiosks/Switchyard Panel rooms in the Switchyard with HMI control through Control room. Carrier protection & Speech/data communication has been provided by Fibre optic terminal equipment & PLCC.

B) Substation Automation:

This Substations are automated with segregated architecture i.e., Bay Control units and protection panels have been placed in respective Bay Kiosks/Switchyard Panel rooms in the Switchyard with HMI control through Control room. Carrier protection & Speech/data communication has been provided by Fibre optic terminal equipment & PLCC.

C) Review of Equipment specifications and drawings of transformers, circuit breakers, lightning arresters, Equipment specifications and GA drawings).

The GA drawing and GTPs of the Switchyard equipment & transformers were reviewed and found to be in order. As already stated above, all equipment including transformers have been supplied by reputed manufactures of India as well as overseas and their drawings have already been standardised. All equipment & Transformers conform to standard specification & IEC/IS.

D) Review of Ratings of all the installed critical Electrical Equipment's like Transformers, Circuit breakers, CT's, CVT's.

The equipment ratings including transformers, CT, CVT and CB were reviewed and found to be in order.

The dielectric strength of all equipment and transformers i.e., Lightning impulse withstand voltage, Switching impulse withstand voltage (for 400 kV only), Power frequency voltage withstand and rating of LAs (390 kV for 400 kV,216 kV for 220 kV and 120 kV for 132 kV) have been standardised by Central Electricity authority, CBIP and international & Indian standards like IEC/IS. All transformers & equipment installed in this Substation conform to standardised insulation parameters. Further LAs have been installed at line entry and both sides of transformer to prevent travelling waves of higher magnitude. Thus, safeguard against insulation failure has been ensured.

Adequate fire protection facility has been provided in both the stations. Firefighting Annunciation panels have been placed in both Control room & FFPH to give alarm in case of any abnormality in the system. Further alarm/trip signals are configured in the HMI placed in Control room.

E) Review of suitability of SCADA Systems

As already stated above, Substation automation system has been installed in both the stations to control & monitor all equipment from local control centre as well as remote control centre with the help of Bay level units placed in Switch yard Panel rooms in GIS Building. Presently control & monitoring is done from HMI placed in control room. It can also be operated from any Remote-control centre. It has extensive range of supervisory control and data acquisition

facility. Presently the supervisory control is from State Load Despatch centre. All necessary data of these stations are being accessed from ERLDC control centre at Kolkata as well as Control & Analytics Centre (CAC) at Mumbai.

For the substations, state of the art Substation Automation System (SAS) conforming to IEC: 61850 has been provided. The system configured has redundant Operating Workstations (OWS) having a master and standby configuration and in case of any disturbance, the changeover of standby OWS as Master OWS is automatic enabling seamless access to Substation Operating Systems to the operating personnel.

Distributed architecture has been used for Substation Automation System, where the controls are provided through Bay Control Units. The Bay Control Unit is provided bay wise for voltage level 132 kV and above. All Bay Control Units as well as Protection Units are connected through an Optic fiber high speed network. The control and monitoring of Circuit Breaker, Disconnector, resetting of Relays etc. shall be done from Human Machine Interface (HMI) in the Control Room.

SAS is equipped with the facility of remote operation. By providing remote HMI and suitable communication link, the Substation can be controlled from a remote location. The functions of control, annunciation, disturbance recording, event logging and measurement of electrical parameters have been integrated in Substation Automation System. The Automation System are provided with the facility of communication and control for remote end operation. Large Video Screen (LVS), Operator Stations (HMI-01, 02), Engineering PC, Metering Station, Dot Matrix and Inkjet Printers, Scanner are all installed in SCADA Room.

4.4 Protection & Control

4.4.1 Protective Relaying System

The Protection Relay System have been provided for Transmission Lines, Auto-Transformers and Bus bars to minimize for protection of the Equipment in case of any faults in the system.

4.4.2 Protection on Transmission Lines

a) 400 kV and 220 kV lines have Main-I Protection with Numerical Distance Protection Scheme as three Zone Distance type with Carrier aided Inter-Tripping feature. 400 kV and 220 kV Lines have Main-II Protection with Numerical Distance Protection Scheme like Main-I but of different make.

b) 132 kV lines have Main-I as Numerical Distance Protection Scheme as three Zone Distance type with Carrier aided Inter-Tripping feature and also have Directional Over-Current and Earth Fault Protection as backup. All 400 kV Lines are provided with two (2) stage Over Voltage Protection.

4.4.3 Protection on Transformer

The Auto Transformers have been provided with the following protections.

(i) Differential Protection

(ii) Restricted Earth Fault Protection

(iii) Over-Current and Earth Fault Protection on HV/MV sides

(iv) Over Fluxing Protection

(v) Overload Alarm.

Normal inbuilt protections of Power Transformers like Buchholz Relay, protection against High Oil and Winding Temperatures and Pressure Relief Device are also there.

4.5 Communication System

Power Line Carrier Communication (PLCC) equipment are used for Speech communication, Line Protection signal and data transmission which are duly provided on each 400 KV Transmission Line. The PLCC equipment consist of Coupling Device, Line Traps, Carrier Terminals, Protection Couplers, HF Cables, etc. The line traps are broad band tuned suitable for blocking the complete range of carrier frequencies. Line Traps have the necessary protective devices such as lightning Arresters for the protection of tuning device.

As per Indian Electricity Grid Code (IEGC) sub-stations have to provide real time data and voice from their stations to RLDC for efficient grid management. Also, as per the Technical Standards for Communication System in Power System Operations, the communication system shall be formed by a wideband network using fibre optic communication cable(s) to support the requirement of power system operation.

In consideration of the same, Darbhanga-Muzaffarpur 400kV D/c transmission line is provided with 24-F (24 Fiber) OPGW in place of one earth wire. OPGW serves dual purpose i.e., Grounding wire as well as Fiber Optic Communication Cable. FOTE (Fiber Optic Terminal Equipment) Panels (ABB make FOX615) are provided at both ends of OPGW Line between Darbhanga & Muzaffarpur sub-stations. It may be worthwhile to note that the same may be utilized in future for Data, Voice, and back-up Tele-Protection applications through telecom service providers. Additional interface equipment is also provided at Muzaffarpur end for further data connectivity to ERLDC using existing fibre link network.

400KV Motihari-Gorakhpur D/C LILO section transmission line is provided with 24-F (24 Fiber) OPGW in place of one earth wire. OPGW serves dual purpose i.e., Grounding wire as well as Fiber Optic Communication Cable. FOTE (Fiber Optic Terminal Equipment) Panels (COMTEL make) are provided at both ends of OPGW Line between Motihari & Gorakhpur sub-stations by PGCIL*. The same is being used for Data, Voice, and back-up Protection application providers. Additional interface equipment is also provided at Gorakhpur end by PGCIL for further data

connectivity to ERLDC/NRLDC using existing fibre link network. In addition, DMTCL may earn some additional revenue a) by use of OPGW for data connectivity and b) by venturing in to leasing of few of its Transmission Towers, for telecom services as, few Transmission Licensees have already ventured in to the same.

*As per RFP of ERSS VI., Motihari substation doesn't have provision for OTE panel to establish data communication due to non-availability of OPGW in existing 400KV D/C Barh – Gorakhpur TL. At later stage PGCIL has installed the OPGW in Barh Gorakhpur Section and installed the FOTE panel at Motihari end which is used for data communication in addition to PLCC system.

4.5.1 400/220kV GIS Substation at Darbhanga:

(i) One STM-4 Equipment is provided along with necessary interfaces to meet the voice and data communication requirement and is integrated with the CTU Communication Equipment at remote end.

(ii) Fibre Optic distribution Panel (FODP) and Approach Cable (24F) is provided, which is connected with OPGW installed on Muzaffarpur –Darbhanga 400kV D/C Line up to gantry of 400kV Darbhanga Substation by TSP.

(iii) Phasor Measurement Units (PMUs) have been installed at the Darbhanga GIS Substation for all the bays (Line/Feeders & Transformers) of the Substation which shall support IEEE C-37.118.2011 protocol. These PMUs are integrated with the PDC (Phasor Data Concentrator) located at ERLDC (Eastern Region Load Despatch Centre).

(iv) RTU/SAS have been installed with necessary interfaces which are integrated with ERLDC SCADA System on IEC 60870-5-101/104 protocol.

4.5.2 400/220kV GIS Substation at Motihari GIS Substation:

(i) One STM-4 equipment is provided along with necessary interfaces to meet the voice and data communication requirement and is integrated with the CTU communication equipment at remote end.

(ii) FODP and Approach Cable (24F) is provided, which is connected with OPGW installed on LILO portion of Barh – Gorakhpur D/C (Quad) Line upto the gantry of 400kV Motihari Substation gantry by TSP.

(iii) Phasor Measurement Units (PMUs) have been installed at Motihari GIS Substation for all the bays (Line/Feeders & Transformers) of the Substation which shall support IEEE C-37.118.2011 protocol. These PMUs are integrated with the PDC (Phasor Data Concentrator) located at ERLDC (Eastern Region Load Dispatch Center).

(iv) RTU/SAS have been installed with necessary interfaces which are integrated with ERLDC SCADA System on IEC 60870-5-101/104 protocol.

5.0 TRANSMISSION LICENCE

As per article 3.1.3 of the TSA the TSP has to obtain the Transmission Licence from respective commission within 6 months of the effective date. In compliance of the same DMTCL filed a petition under section 14 read with Section 15(1) of the Electricity Act, 2003 for grant of Transmission Licence to Darbhanga- Motihari Transmission Company Limited (DMTCL) with CERC vide Petition No 324/TL/2013. CERC after due hearings granted transmission licence to DMTCL bearing **Licence No 24/Transmission/2014/CERC** vide order **dated 30.05.2014**. The grant of transmission licence to the petitioner had all the subject conditions as laid down by the commission. However major highlighting points are:

- The transmission licence shall, unless revoked earlier, remain in force for a period of 25 years;
- Since the expiry date as per the TSA is 35 years from the scheduled COD of the project, the petitioner may make an application, two years before the expiry of initial licence period, for grant of licence for another term in accordance with Regulation 13 (2) of the Transmission Licence Regulations which shall be considered by the Commission in accordance with law.

5.1 Extension of Licence

As per Section 15 of the Electricity Act:

> *[4](8) A licence shall continue to be in force for a period of twenty- five years unless such licence is revoked'.*

These 25 years are counted from the date of grant of licence that includes construction period as well. However, the tenure of Transmission Service Agreement to operate the assets is for 35 years from the date of commercial operation. Therefore, to cover the gap it has been specifically provided in the licence that, 'since the expiry date as per the TSA is 35 years from the scheduled COD of the project, the petitioner may make an application, two years before the expiry of initial licence period, for grant of licence for another term in accordance with Regulation 13 (2) of the Transmission Licence Regulations which shall be considered by the Commission in accordance with law.

Regulation 13(2) of the CERC Transmission Licence Regulations states,

> *'(2) If the useful life of the transmission asset for which transmission licence has been issued extends beyond the period of 25 years, the Commission may consider on merit of each case to grant licence for another term for which the licensee may make an application in accordance with Regulation 7 two years before the expiry of the initial period of licence: Provided that when the licensee does not make an application for grant of licence beyond the initial period of 25 years, the Commission may, to protect the interest of the consumers or in public interest, issue such directions or formulate such schemes as it may deem necessary for operation of the transmission assets for the remaining part of its useful life'.*

As a general practice observed in the industry and considering the performance of the company since COD, there is no risk of non-extension of licence after initial period 25 years.

5.2 Terms of Revocation of Licence

Section 19 of the Electricity Act stipulates the terms on which licence may be revoked. The reasons and process of revocation of licence as specified is follows:

Section 19.

19. If the Appropriate Commission, after making an enquiry, is satisfied that public interest so requires, it may revoke a licence in any of the following cases, namely:

(a) *Where the licensee, in the opinion of the Appropriate Commission, makes wilful and prolonged default in doing anything required of him by or under this Act or the rules or regulations made thereunder;*

(b) *Where the licensee breaks any of the terms or conditions of his licence the breach of which is expressly declared by such licence to render it liable to revocation;*

(c) *Where the licensee fails, within the period fixed in this behalf by his licence, or any longer period which the Appropriate Commission may have granted therefore*

(i) To show, to the satisfaction of the Appropriate Commission, that he is in a position fully and efficiently to discharge the duties and obligations imposed on him by his licence; or

(ii) To make the deposit or furnish the security, or pay the fees or other charges required by his licence;

(d) *Where in the opinion of the Appropriate Commission the financial position of the licensee is such that he is unable fully and efficiently to discharge the duties and obligations imposed on him by his licence.*

(e) *Where in its opinion the public interest so requires, the Appropriate Commission may, on application, or with the consent of the licensee, revoke his licence as to the whole or any part of his area of distribution or transmission or trading upon such terms and conditions as it thinks fit.*

(f) *No licence shall be revoked under sub-section (1) unless the Appropriate Commission has given to the licensee not less than three months' notice, in writing, stating the grounds on which it is proposed to revoke the licence, and has considered any cause shown by the licensee within the period of that notice, against the proposed revocation.*

(g) *The Appropriate Commission may, instead of revoking a licence under subsection (1), permit it to remain in force subject to such further terms and conditions as it thinks fit to impose, and any further terms and conditions so imposed shall be binding upon and be observed by the licensee and shall be of like force and effect as if they were contained in the licence.*

(h) *Where the Commission revokes a licence under this section, it shall serve a notice of revocation upon the licensee and fix a date on which the revocation shall take effect.*

(i) *Where the Appropriate Commission has given notice for revocation of licence under sub-section (5), without prejudice to any penalty which may be imposed or prosecution proceeding which may be initiated under this Act, the licensee may, after prior approval of that Commission, sell his utility to any person who is found eligible by that Commission for grant of licence'.*

In view of above, it is most likely that licence of the Company shall be extended in accordance with law.

6.0 ENVIRONMENT AND SAFETY

Transmission line projects are environment friendly and do not involve any disposal of solid effluents and hazardous substance in land, air and water. Transmission line projects are not included in the list of project activities that require prior Environmental Clearance as per the notification issued by MoEF on 14th September 2006. Therefore, no Environmental Clearance is applicable for this project. Forest Clearance under Forest (Conservation) Act, 1980 from Ministry of Environment Forests and Climate Change (MoEFCC) is a mandatory requirement wherever transmission line involves forest area. Accordingly, forest clearance has been obtained for the DMTCL project.

Due care has been taken to prevent / mitigate community environmental aspects such as EMF exposure, electric shocks and fire hazards, contamination of environmental receptors, noise level etc

Adoption of measures such as provision of oil pits and sumps, responsible disposal of used transformer oil, electronic waste as per applicable regulations and prevention of leakage of SF6 gas through regular monitoring using sophisticated instruments and inventory control has resulted in compliance with the regulatory framework. Moreover, during replacement, SF6 gas is not released in the atmosphere but pumped into cylinders and returned to OEM.

The safety requirements during the operation and maintenance of electric lines and substations are defined in the CEA regulations 2011. (Safety Requirements for Construction, Operation and Maintenance of Electrical Plants and Electric Lines).

Being a ISO compliant DMTCL uses to monitor following on monthly basis:

a. Green House Gas emission
b. Water consumption
c. Hazardous waste management
d. Scrap disposal in line with SOP defined
e. Mock Drills are being carried out as per the frequency decided by management
f. Regular training & online training through Rapid Learning App.

DMTCL has also implemented, rain water harvesting at both the substation, separate oil storage system to avoid any spillage in to the soil.

As per the standard practice of DMTCL & SEPL, any work to be carried out during O&M, will call for applicability of a) management of change, b) LOTO, c) PTW from competent authority as identified, to avoid any unsafe act and to avoid any impact on SHE aspect to all the relevant stake holder.

From above it is visible that all standard procedures for safety are followed during construction, testing, operation and maintenance of all the elements. Strict safety procedures for isolation, and permission to work protocols are in place.

7.0 QUALITY CONTROL:

In order to ensure quality of Contactor supplied Materials, the Project Company informed that proper MQP (Manufacturer Quality Plan) and FQP (Field Quality Plan) have been implemented and were practiced. Field Quality Assurance and Standard Field Quality Plans (SFQP) for substations and transmission lines, standard formats and guidelines are part of the Technical Specification. The field quality plan covers all aspects during construction and erection of transmission lines and substations.

To ensure compliance to technical requirements as stipulated in the RFP and also conforming to CEA regulations for construction of sub-stations, all the equipment were tested as per relevant Indian (BIS) and international Standards (IEC). The equipment suppliers furnished the reports for type tests as per technical specification. These type tests are conducted in accredited laboratories or witnessed by Central, State or other reputed Indian Utilities. Routine and Acceptance tests were conducted as per relevant IS/IEC during manufacturing stage. Comprehensive Manufacturing Quality plans covering quality of raw materials, bought-out items, Type, Routine/Acceptance tests and Final inspection procedure as per best industry practices were finalized by Contractor's Engineers and respective OEM's which were further reviewed by M/s Feedback Infra Private Limited, the Owner's Engineer for this project.

The Field Quality Plan for Erection works following industry's best practices & relevant standards were prepared by the EPC contractor/ Sub-contractor and further reviewed and approved by M/s Feedback Infra Private Limited, the Owner's Engineer. The Field Quality Plan for Civil works was prepared by the EPC contractor/sub-contractor as per best practices of the industry and as per relevant IS and CPWD specifications and further reviewed & approved by M/s Feedback Infra Private Limited, the Owner's Engineer for this project.

IE reviewed the MQP of various equipment and the FQP for the project. The MQP and FQP are in line with the industry practice. Additionally, it was found that the test results/ certificates for various equipment, reviewed by the IE were in line with the standards/ benchmarks stated in the MQP/ FQP.

Complete quality control plan during various stages of manufacturing, erection, factory, and site testing has been carried out as per the standard quality control plan. The system has been designed and constructed as per CEA,

CBIP & various national & international standards. Erection, testing and commissioning at site has been carried out under the supervision of DMTCL as per the standard procedures and protocols. The components have been designed, manufactured, transported, stored, erected, tested, and commissioned in compliance with relevant Indian & International standards.

8.0 OPERATION AND MAINTENANCE

A general O&M set up for transmission line includes a line in-charge, a transmission line maintenance engineer and a team of junior engineers, technicians and fitters. The team composition is flexible and is augmented/ strengthened based on requirements at the site.

8.1 Organogram for O&M of Substation & Transmission Lines:

O&M of all the elements are being regularly monitored through CAC by Senior at Corporate Office, Mumbai who interacts with O&M team of SPV for ensuring timely compliance to preventive maintenance schedule, sharing of best practices followed in industry, providing opportunity for learning and development. On ground, DMTCL substations and transmission lines are being managed by SPV In charge. They are supported by Shift Engineers/TL Engineers at Motihari and Darbhanga Substations/locations. The technicians/line supervisors/fitters and other supporting staff for the O&M are hired as shown in Organisation Chart illustrated below. The Team under SPV Incharge comprises of 22 members each at Motihari and Darbhanga for Substation and 9 members each for Darbhanga – Muzaffarpur Transmission line and Barh-Motihari-Gorakhpur LILO Transmission line consisting of (Engineers, Technicians and Helpers) from JBS Limited.

Organization Structure of Darbhanga Motihari Transmission Company Limited – Substations

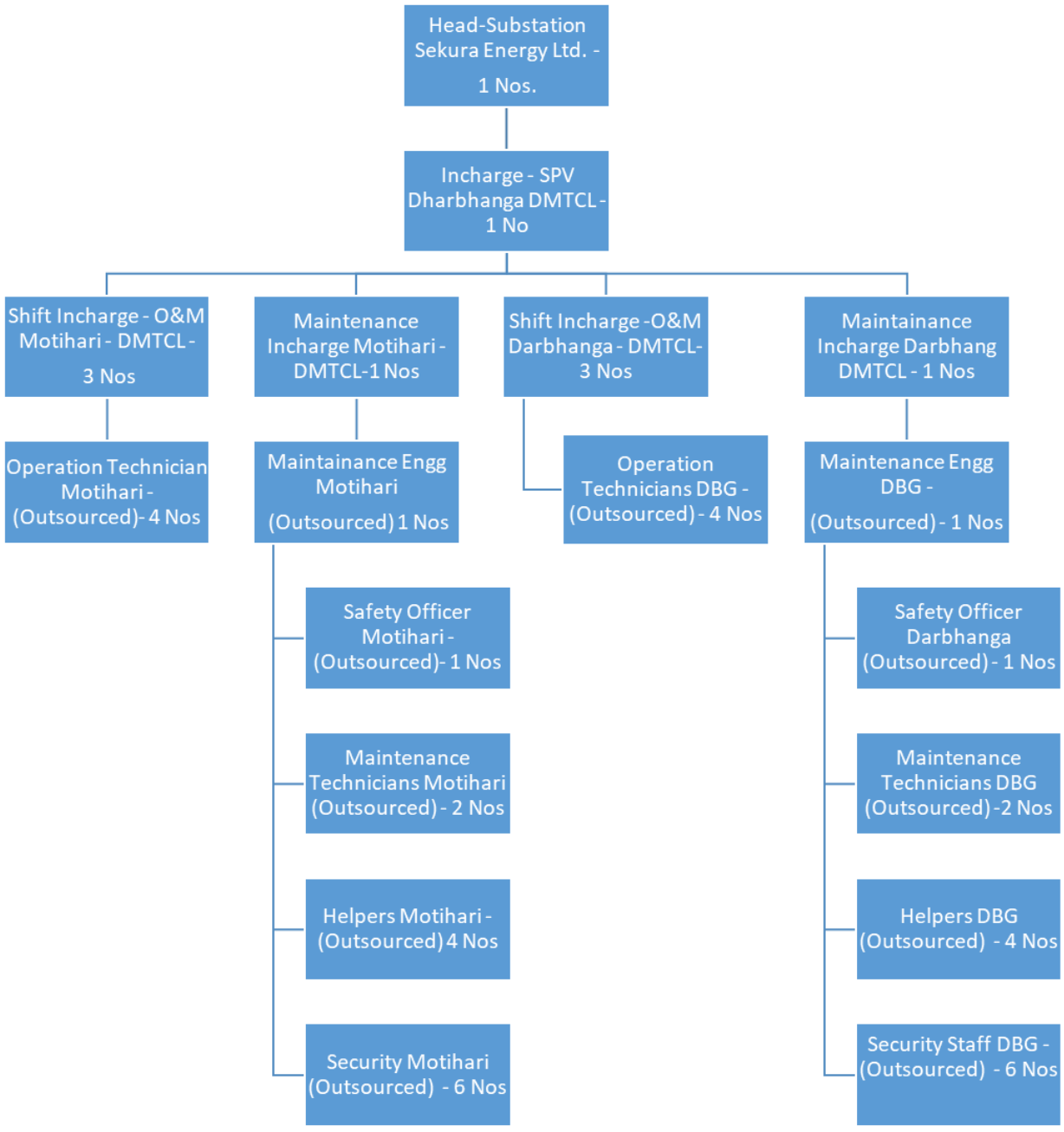


Figure 2: Organogram for O&M – DMTCL - Darbhanga

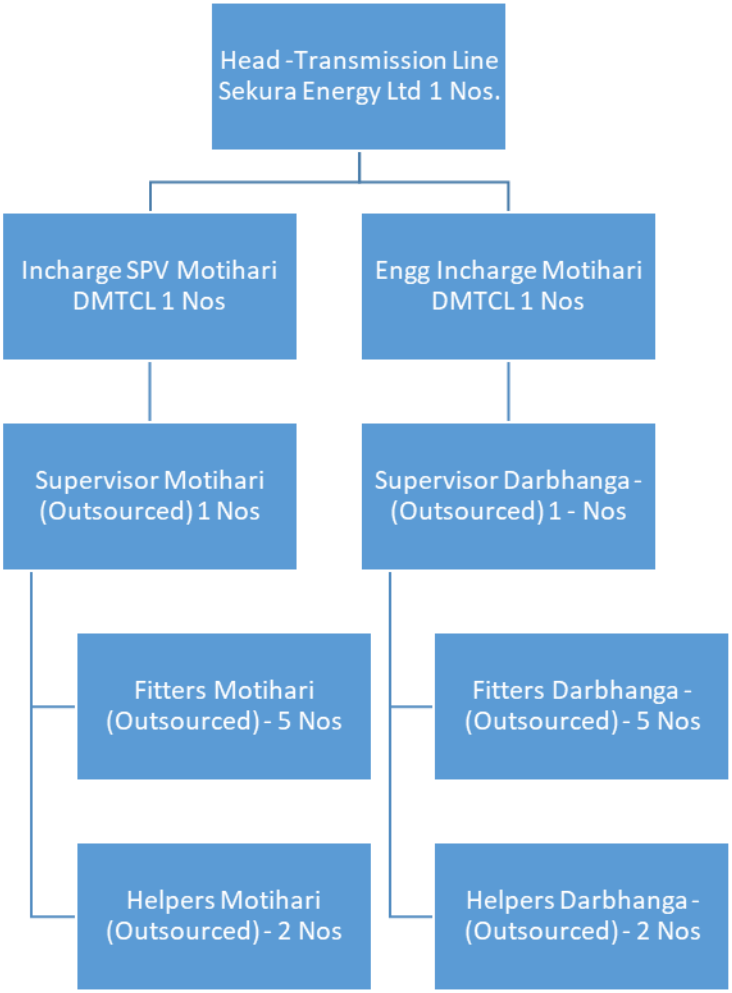


Figure 3: Organogram for O&M – DMTCL - Motihari

From the organization chart it is observed that the O&M manpower is sufficient for maintenance of the assets created.

8.2 Maintenance of Transmission lines

Routine and preventive maintenance of transmission lines is being carried out as per defined / standard schedules for transmission lines; and best practices in O&M such as regular patrolling of lines, periodic removal of vegetation, thermo-vision scanning, online insulator puncture detection etc. have been adopted. Trained in-house manpower/ hired manpower on contract basis has been identified to swiftly attend any unforeseen eventualities/ natural calamities.

As per CBIP manual, following is the patrolling schedule for different voltage class transmission lines.

Table 8: Patrolling Schedule as per CBIP manual

Type of patrolling	Schedule
Ground Patrolling-400 kV Lines	Six Monthly
Ground Patrolling-765 kV Lines	Four Monthly
Ground Patrolling- Critical locations	Three Monthly
Emergency patrolling	Immediate

As against the above mentioned patrolling schedule, DMTCL carries out the patrolling activities as per below schedule

Table 9: Patrolling Schedule as practiced

Patrolling activities by DMTCL for 400 KV D/C Transmission Lines	Frequency of activities carried out by DMTCL Team
Thermo vision scanning	Annually
Tower Footing Resistance (TFR)	Annually
Clearances at all important crossings	Six Monthly
Ground Patrolling of lines	Every tower is covered in three months once as against six months recommended in CBIP manual
Tower top patrolling	Every tower is covered in Six months once
Critical locations patrolling	covered on monthly basis
Emergency patrolling	Immediately as per the site requirements

Patrolling for 400 KV Transmission Lines towers is six monthly as per CBIP manual while DMTCL team is carrying out the patrolling every three months.

8.3 Maintenance of Transmission Substation

At DMTCL substation, O & M team observe the frequency of Maintenance Checklists as below:

Table 10: Maintenance Checklist

Maintenance Checklists									
S. No.	Document	Shift	Daily	Weekly	Fortnightly	Monthly	Quarterly	Half Yearly	Yearly
1	Substation Rounds, General Checks	√							
2	Hourly WTI & OTI Readings of Transformer & Reactors	√							
3	220V & 48V Battery charger readings	√							
4	FF System checks	√							
5	PLCC Readings	√							
6	Energy Meter Readings (Mid Night)	√							
7	CB Counter & Spring charge status of 400KV & 132KV	√							
8	LA Counter & Leakage Current readings of 400KV & 132KV		√						
9	Check oil levels of Bushings, OLTC & Main conservators		√						
10	Check oil leakage and general body inspection		√						
11	Energy Meter AMR data abstraction			√					
12	Sf6 Gas Monitor Reading for GIS			√					
13	Battery Cell reading for 220V & 48V Battery Set 1 & 2				√				
14	Back Up DG Set Operation & checklist				√				
15	EOT Crane Operation & Checklist of 400KV & 132KV					√			
16	Inspection checklist - Fire Water Pump House					√			
17	Inspection Checklist - FF System DG Set					√			
18	Inspection Checklist - LA - 400KV & 132KV					√			
19	Inspection Checklist - CVT - 400KV & 132KV					√			
20	Inspection Checklist - Line Reactors (50 & 80 MVAr)					√			

Maintenance Checklists									
S. No.	Document	Shift	Daily	Weekly	Fortnightly	Monthly	Quarterly	Half Yearly	Yearly
21	Inspection Checklist - Bus Reactors (125 MVAr)					√			
22	Inspection Checklist - Interconnecting Transformer (200 MVA)					√			
23	Inspection Checklist - CB - 400KV & 132KV					√			
24	Inspection Checklist - 33kV & 11KV Transformer					√			
25	Inspection Checklist - 66KV CT					√			
26	Inspection Checklist - 66KV PT					√			
27	Inspection Checklist - 66KV CB					√			
28	Inspection Checklist - 66KV Isolator					√			
29	Inspection Checklist - AC Auxilary Switch Boards					√			
30	Inspection Checklist - DC Auxilary Switch Boards					√			
31	Inspection Checklist - Illumination Panels					√			
32	Inspection Checklist - Air Conditioning System					√			
33	Inspection Checklist _ Thermovision					√			
34	Inspection checklist - Portable Fire Extinguishers						√		
35	Inspection checklist - Hydrant Hose Box						√		
36	Inspection checklist - Hydrant Point						√		
37	Inspection checklist - High Velocity Water Sprinklers						√		
38	RCCB/RCBO Test _ Sensitivity						√		
39	Inspection cheklist - Scaffold set						√		
40	Inspection checklist - Smoke Detector & Heat Detector							√	
41	Inspection checklist - Manual Call Point & Hooter							√	

Maintenance Checklists									
S. No.	Document	Shift	Daily	Weekly	Fortnightly	Monthly	Quarterly	Half Yearly	Yearly
42	Maintenance Activity - 66KV System							√	
43	Maintenance Activity - 11KV System							√	
44	PM - Line Bays - 400KV & 132KV								√
45	PM - Line Reactor Bays								√
46	PM - Bus Reactor Bays								√
47	PM - Inter connecting Transformer Bays								√
48	Inspection Checklist - C & R Panels								√
49	Inspection Checklist - LCC Panels								√
50	Maintenance Activity - DG System								√
51	Maintenance Activity - FF System								√
52	Inspection checklist - Earthing System								√
53	Inspection checklist - Lighting Protection System								√
54	Protection Checks - Substation (3 Years)								

9.0 BEST PRACTICES BY DMTCL

It is observed that DMTCL has implemented various aspects of improvement required for safe, secure and sustainable operation & maintenance of all the elements of its assets. As a part of improvement action, following actions are observed to have been initiated and implemented in addition to standard O&M practices:

1) Pre & Post monsoon Drone survey of Transmission lines to promptly identify & initiate actions on all the areas of concern.

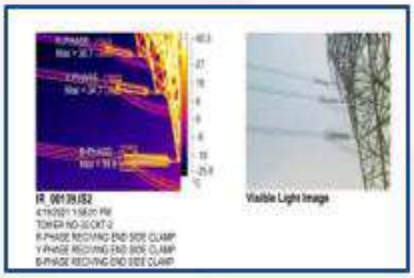
2) Implementation of ISO-14001 for Environment Management System and ISO-45001 for Occupational Health & Safety Management, ISO 27001 for Provision of IT services to Operational and maintenance of transmission lines and substation and ISO 55001 for Asset Management System.

3) Currently DMTCL has 4 certified Lead Auditors in its team available to lead the process of ISO 55001 along with 11 others Lead auditors in SEPL.
4) Pro-active Construction of flood protection wall at Darbhanga Substation to avoid any flooding on account of any breach of river embankment at Kamla & Baghmati rivers.
5) Establishment of Centralized Analytics Center (CAC) at Mumbai which monitors all operations and maintenance w.r.t to PM schedule and routine maintenance through maintenance management software installed at CAC.
6) Installation of wind monitoring station on tower in Gandak River, to collect authentic data on wind speeds in the vicinity of assets which facilitates planning of annual maintenance of the assets.
7) Considering the best practices followed by DMTCL, the SPV M/s Power Grid Mithilanchal Transmission Limited (M/s PMTL) of Central Utility M/s Power Grid India Limited, has entrusted Operation & Maintenance of their asset at Darbhanga & Motihari Substations.

DMTCL is following stringent compliance to all their SOPs for O&M, SHE. It is also observed that the risk & compliance, learning & development, and compliance to SHE practices are being monitored by using various tools and applications like a) Komrisk, b) RAPL and c) Gensuite, by all DMTCL employees on regular basis.

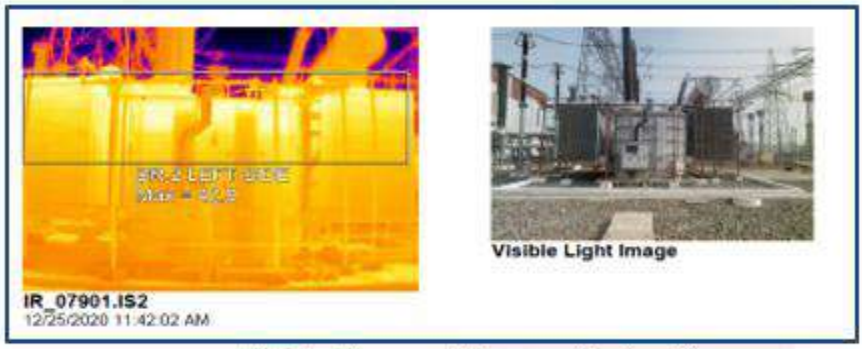
With the implementation of all the above DMTCL has been able to minimize undue tripping/break down and has achieved highest availability for its assets.
Some of the project elements and practices in DMTCL are as shown below:

Physical (using App) and drone-based tower inspections

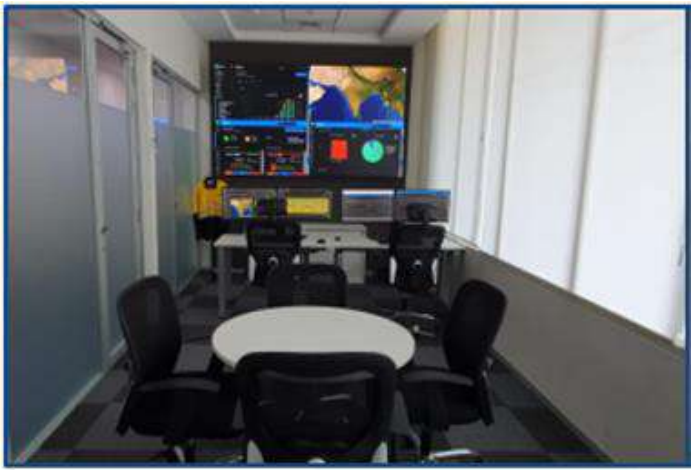


Line condition monitoring

Foundation and tower design sufficiency



Substation condition monitoring & performance assessment



Remote Control & Analytics Centre (CAC) located in Head Office, Mumbai**

*** Photos are provded by SEPL.*

10.0 AVAILABILITY OF ASSET

Calculation of availability of the projects acquired through TBCB mechanism is carried out as stipulated in the respective TSA. The outage data of the company is submitted to respective RLDC(s) for checking. Based on the certified outages by RLDC(s), the RPC(s) issues the availability certificates.

Table 11: Transmission System Availability

Availability of DMTCL System as Certified by ERPC	
FY-2019-20	
Month	**Monthly Availability**
Apr-19	99.52%
May-19	99.99%
Jun-19	99.91%
Jul-19	99.81%
Aug-19	98.80%
Sep-19	100.00%
Oct-19	99.99%
Nov-19	100.00%
Dec-19	100.00%
Jan-20	100.00%
Feb-20	100.00%
Mar-20	100.00%

FY-2020-21	
Month	**Monthly Availability**
Apr-20	100.00%
May-20	99.97%
Jun-20	100.00%
Jul-20	100.00%

Aug-20	100.00%
Sep-20	99.91%
Oct-20	100.00%
Nov-20	100.00%
Dec-20	100.00%
Jan-21	100.00%
Feb-21	100.00%
Mar-21	100.00%

FY-2021-22	
Month	**Monthly Availability**
Apr-21	100.00%
May-21	99.99%
Jun-21	99.77%
Jul-21	99.96%
Aug-21	100.00%
Sep-21	100.00%
Oct- 21	100.00%
Nov -21	100.00 %
Dec -21	100.00%
Jan -22	100.00%
Feb- 22	100.00%
March -22	100.00%

FY-2022-23	
Month	**Monthly Availability**
Apr-22	99.98%
May-22*	99.99%*
Jun-22*	100.00%*

*(Number based on internal calculation of Availability & submission to ERPC. This is subject to issuance of final availability certificate.)

As per TSA, the target availability for the project should be 98%. The company is entitled to receive incentive/ required to pay penalty based on the annual transmission system availability.

From the availability certificates provided, It is observed that the average availability of elements from date of COD is more than 99.75 % and this is well beyond normal availability 98% enabling full revenue recovering and incentive

Note:

Availability numbers are inclusive of Force Majeure relief as approved by authority. DMTCL was successful in getting FM relief duly invoking relevant FM related provisions in the TSA.

11.0 SPARE PART MANAGEMENT:

Necessary spares for Transmission lines and Sub-stations have already been procured by DMTCL. All mandatory spares are kept in stock. Also contract agreements has been signed with vendors for important spares like towers & other items which can be procured on as and when required basis. Also whenever necessary, spares are procured to replenish the stocks.

Spare Parts Management for Motihari & Darbhanga Substations:

Please note that technical specifications and OEMs of all major equipment are similar for both substations and both substations are in proximity of same region. Spares requirements for both substations are identified and optimized inventory has been kept.

For all major equipment/material like power Transformers, Reactors, 400 KV, 220 KV & 132 KV GIS, EHV cables, Termination kits etc all mandatory and critical spares are purchased from respective OEMs. These spares are stored at Darbhanga & Motihari substation in indoor & outdoor store yard within substation premises to attend any urgent & critical requirement of break down.

11.1 Sub Station Spares:

a) Spares for transformers and reactors:

All major spares are available at both the substation and non – critical spares are kept at Motihari substation as a common inventory.

b) For GIS equipment's/components:

All Critical spares related to GIS are kept at Motihari substation which can be utilized to meet requirement.

In addition to above, SF-6 gas, density monitor, GIS to air bushing are also available at Darbhanga Substation.

c) Spare surge arrestors: Available for all ratings 400kV, 220 & 132kV surge arrestors.

d) 400Kv and 220KV: Adequate CVTs are available.

e) Spare for EHV, HV, LT Power & Control Cable & it's accessories: EHV cables along with EHV termination kits along with other associated accessories are available. All variety of LT power & Control Cables are available to meet any failure.

f) Major Spares for C&R panel, PLCC & FOTE & Fire protection system are also available,

g) AC & DC system spares, Lighting Fixtures, EOT cranes, Fire Fighting System, HVAC system: All required spares as per standard practice are available.

11.2 Transmission Lines Spares

Long term supply agreement for Tower parts and Towers is signed with reputed vendor to cater emergency requirement, however, stubs templates for all type of towers and few spare towers, all other required materials like insulators, hardware fittings, grading rings, Earth wire, conductors and other required accessories are available. It is observed that for Transmission Lines adequate spares are maintained as per the attached list Annexure.

12.0 PHYSICAL SECURITY OF ASSET:

12.1 Security of Transmission Line:

As we know that the Transmission lines are spread across the country and no exclusive security can be deployed for that. The only measure available as on date with the Owners is regular patrolling of the transmission line which is normally scheduled in such a way that every tower of the line is checked at least three times in a year for 765 kV/ critical / vulnerable locations and at least two times in a year for 400 kV lines. In case of any theft in transmission line the issue is taken-up with local authorities. However, in DMTCL even though the assets comprise of 400kV but still every tower is covered in patrolling every three months.

12.2 Security of Stores & Substation, practice adopted details:

DMTCL has implemented -Security Management plan for Motihari & Darbhanga Substations, to ensure physical, administrative and procedural security of respective Assets.

The main objectives achieved by implementation of Security Management Plan are:

- Strengthening of physical measures with well-trained security guards.
- Prevention of loss /Theft of material from the site with adequate procedural safeguards
- Restrict complicity of security personnel or nexus between workers and outsiders
- Restrict interference of unauthorized persons at project site
- Better control on Inward and outward movement of materials owned by SPV /Contractors / any others.

Current security controls in DMTCL:

(a) Boundary wall/ Chain link Fencing & Gates

- Boundary wall / Chain link Fencing is the first layer of security for Substation which protects the Substation from unauthorized access.
- Access points and entry gates are secured through a lock.

(b) Periphery lighting and area lighting

- Lighting at the periphery of the boundary has been strategically placed with in Substation and important areas are illuminated to enable security guards to patrol perimeters area, gates, guard posts, main control room, substation areas and Storerooms etc.

(c) Electronic surveillance

- All access points are monitored 24/7 by electronic surveillance
- Substation has been deployed with closed circuit television (CCTV) cameras.
- These cameras are strategically placed throughout the Substation.
- These cameras live feeds shall be continuously monitored by control room operators.
- The recordings of camera feeds are stored for temporary period in local storage.

(d) Employee, Contractor and Visitor Identification Badges

- The purpose of the providing identification badges to employees, contractors and visitors is to enhance the security and safety of them and the asset. Each employee, contractor or visitor is responsible for the integrity and safe keeping of his or her badge. Detailed guideline for using these badges have been elaborated in the Security management plan.

12.3 CCTV security system:

CCTV security system has been provided at Darbhanga Substation which comprises of seven cameras installed at selective locations inside the Substation and CCTV screen inside SCADA Room. CCTV security system has not been provided at Motihari.

Based on the stringent security processes, various measures put in places and details of monitoring provided by DMTCL, it is observed that the Substation premises are well guarded and secured from unauthorized access as well as any mischief in normal circumstances.

13.0 CYBER SECURITY:

With the current advancement in the IT sector Cyber threats to critical assets have become important aspect to be watched and monitored on regular basis. The Assets under operation are vulnerable to cyber threats due to use of Operational Technology (OT). The company has put in place appropriate controls to minimise cyber risks to its operating assets. The cyber security aspect related to design, engineering, procurement, construction of transmission systems; Operation and Maintenance activities for transmission systems, and Communication Systems comply to the requirements of construction standards by CEA, Indian Electricity Grid Code, 2010 and framework specified under Information Technology Act, 2000. DMTCL coordinates with CERT-IN, the statutory bodies established under Information Technology Act, 2000, regarding specific cybersecurity threat inputs and mitigating measures. DMTCL is in process of obtaining ISO 27001 for cyber security compliance and to ensure safety of network.

14.0 RISK ANALYSIS:

In any asset, post the development of the project there are various risks which an asset could encounter during the operation period of the asset. The operating risk due to transient faults, earthquake, short circuit, falling or touching of trees, lightning strike, travelling wave wind, storm, rain, hail-storm, cyclone, flood, over loading etc are part of operations. This can be taken care of by the design, compliance with technical standards, quality plan, inspection and testing. It is evident that these risk are taken care off as this transmission asset is operating with high availability since commissioning of the project.

Sound operation and maintenance practices, adequate qualified/ skilled manpower, preventive maintenance, diagnostic testing, protection audits, healthy work culture, good T&P would ensure reliable operation of the scheme for decades to come. All mandatory spares are kept in stock and spare management ensures timely availability of required spares. These are the other main factors which enables DMTCL to minimize risk of losing availability and any undue incident.

Motihari LILO line is crossing the Gandak River which generally has a history of flooding as negatively experienced by the asset in 2017 – 2018 & 2019-20. Based on the past experience, DMTCL has ensured construction of Pile foundation for 12 towers with preparation for a few more which ensures towers remain safe in Gandak' s main course.

Further in line with pre & post monsoon drone survey carried out in FY 2021, DMTCL has planned & completed pre-emptive works within the Gandak river bund area on Areraj side Bund (. Pre-emptive work covers, construction of two new taller towers on pile foundation in place of four existing towers on normal foundations. Thus, DMTCL has minimize the risk of tower collapse due to change in course of Gandak river by having towers on pile foundations in 5kms of Gandak river stretch wherein the river is flowing since last 20 years or so.

Darbhanga – Muzaffarpur line is passing through Budhi Gandak & Baghmati rivers which are getting swelled/over flows during monsoon season, this overflowing waters are not having high current and generally found stagnant. However, DMTCL has already identified ten tower locations which are close to river banks & proactively taken-up revetment work to protect them from erosion of banks. Conditions of revetments are reviewed on yearly basis and necessary repair/ strengthening and additional revetments is being carried out, on as and when required basis. In addition to foot patrolling, DMTCL undertakes to have Pre & Post – monsoon drone surveys and the data of drone survey is being analysed through Artificial Intelligence (AI) Model , which enables for pre – monsoon measures to be carried out so that the risk to tower locations/lines is minimal. Basis this, DMTCL has ensured proper revetment for 4 locations prior to monsoon 2022.

In terms of risks arising of other external factors, one of the 132kV isolators of Motihari substation was impacted by a flashover while PMTL's (Powergrid's) extension bay was being commissioned. The damaged 132kV GIS Isolators have been replaced by PMTL at free of cost and commissioned successfully in 1st week of June 2022. The isolators replaced by PMTL are functioning normally and entire system is found healthy since commissioning. As per the TSA since 132kV system is not a part of availability calculations this has not impacted the Availability certified for the project and has no impact on the revenue.

Operation of Assets beyond TSA period

As per the RFP document and CERC order granting transmission Licence, the assets have been created by the company on Build, Own, Operate and Maintain (BOOM) basis. The Right of Way (not ownership but limited to related construction and O&M activities) and other statutory approvals belong to the Company.

Though the Transmission Licence is granted for a period of 25 years initially, it can be extended as per various provisions of TSA and CERC Regulations.

The transmission systems are designed to provide a service life of more than 35 years. Though the transmission charges are to be quoted by the Bidders under the TBCB process for a period of 35 years, the useful life can be extended even beyond 50 years, by carrying out regular maintenance, and inspection . The first 400 kV line built in

early 1970s is still in service. Further, many assets of POWERGRID which have completed 30 years and more have been performing well in terms of availability.

While not necessarily relevant to DMTCL, from a sector perspective, the transmission system associated with hydro projects may well be required beyond 50 years depending on evolution of the grid. If there is a grid, the 765 kV and 400 kV lines are indispensable. The right of way is always valuable and even after 50 years lines are usually refurbished, sometimes the voltage is stepped up, sometimes, multi-circuit patches are added.

In view of above analysis, the technical life of transmission system can be considered up to 50 years.

Regarding the life of asset beyond the tariff period, the TSA provides for the following:
Subject to Article 2.2.2 and Article 2.4, this agreement shall continue to be effective in relation to the Project until the Expiry Date, when it shall automatically terminate unless extended by the Appropriate Commission for such period and on such terms and conditions as the Appropriate Commission may specify in this regard in terms of the procedures laid down by the Appropriate Commission for such matters.

15.0 PERMITS AND CLEARANCES:

15.1 Regulatory Clearances:

Table 12: Regulatory related Clearances

S. No.	Event	Approving Authority	Approval Status
1	Transmission Service Agreement (TSA)	PFC Consulting Limited (PFC) as Facilitator/BPC	Signed on 08.08.2013
2	Transmission Licence	Central Electricity Regulatory Commission (CERC)	Granted on 30.05.2014
3	Tariff Adoption (Transmission Charges)	Central Electricity Regulatory Commission (CERC)	Granted on 20.05.2014
4	Approval under Section 68 of Electricity Act, 2003	Ministry of Power, Govt. of India	Permission issued on 24.07.2013
5	Approval under Section 164 of Electricity Act, 2003	Ministry of Power, Govt. of India	Granted on 04.09.2014

15.2 Statutory Clearances:

Table 13: Other Statutory Clearances

S. No.	Event	Approving Authority	Approval Status
1	Power & Telecommunication Coordination Committee Clearance (PTCC)	GOI, Ministry of Power (MOP)	Approval Received for both Darbhanga and Motihari LILO line.
2	Road (SH/NH) Crossings	National Highway / State Road Department	For both Muzaffarpur- Darbhanga line and Motihari LILO line approvals received.
3	River Crossing	Navigational Authority	Not Applicable
4	Railway Crossing	Ministry of Railways	Approval Received for Darbhanga.
			Approval Received for Motihari LILO line.
5	Power Line Crossings	Concerned State Power Utilities	For Muzaffarpur-Darbhanga line, Approvals received.
		/ PGCIL	For Motihari LILO line, Approvals received.
6	Approval for Energization of the System	CEA	Darbhanga Element on 29.03.2017
			Motihari Element Line on 26.07.2017
7	Certificate for completion of Trial run	POSOCO	Darbhanga Element on 09.06.2017
			Motihari Element on 26.09.2017
8	COD		Darbhanga Element: 31.03.2017 (Deemed COD)
			Motihari Element: 10.08.2017
9	CEIG Approval	Chief Electrical Inspector General of India	Muzaffarpur-Darbhanga line & Darbhanga Substation, Approvals received.
			For Motihari LILO line Approval Received & Substation is also received.

10	Forest Clearance	State Govt./ MOEF	Stage-I & Stage-II approvals received for both Darbhanga and Motihari lines

15.3 CEA / CEIG Safety clearances and approvals:

Table 14: Safety Clearances and approvals

Sr. No	Name of Elements	Letter reference No	Approval Date from CEA
1	400KV D/C Darbhanga-Muzaffarpur Line	Initial Approval: RIO/ER/DMTCL/400/220KV SS/DBG/1370 -1371 Intermediate approval: RIO/ER/DMTCL/2019/621 Latest approval: RIO/ER/Approval/DMTCL - Darbhanga/2021 /522	29-03-2017 13-12-2019 14-12-2021
2	400/220KV Darbhanga Substation	Initial Approval: RIO/ER/DMTCL/400/220KV SS/DBG/337-338 Intermediate approval: RIO/ER/DMTCL/2019/621 Latest Approval: RIO/ER/Approval/DMTCL – Darbhanga /2021 / 522	27-06-2017 13-12-2019 14-12-2021
3	400/132KV Motihari Substation	Initial Approval: RIO/ER/DMTCL/400KV/ 132 KV SS/ ARJ/534-335 Intermediate approval: RIO/ER/DMTCL/Motihari/2020/823 Latest approval: RIO/ER/DMTCL - Motihari LILO/2022/33	26-08-2017 16-03-2020 18.04.2022
4	400KV D/C LILO of Barh-Gorakhpur at Motihari	Initial Approval: RIO/ER/DMTCL/400KV TL/BARGH-GKP LILO/435-436 Intermediate approval: RIO/ER/Approval/DMTCL-Motihari/2020-21/612 Latest approval: RIO/ER//DMTCL-Motihari LILO/2022/193	26-07-2017 26-03-2021 31-05-2022

It is observed that all major approvals have been received by the Project Company. Regulatory Clearances like Transmission Service Agreement, Transmission Licence, and approval for Transmission Charges as well as approval under Sections 68 and 164 of the Electricity Act 2003 have been received by the Project Company.

Statutory Clearances like Power & Telecommunication Coordination Committee Clearance (PTCC), Roads, Railway and Power Line Crossings have been received for both the transmission line elements. For the forest area found in the Transmission Line Routes during execution of project, the Project Company has received Stage I & Stage -II approval from MoEF for Darbhanga as well as Motihari element. Approval for the River Crossings is not required from Navigation Authorities in this project as the rivers in this project are not identified as Navigable Rivers. It is understood that adherence to compliance is regularly reviewed and tracked by the company and its management through the Komrisk application and reported to the Board, which is a good practice.

16.0 INSURANCE:

IE has reviewed all the insurance policies for DMTCL and found that insurances are in accordance with the provisions of TSA and has been timely renewed for the period 5th -May-2022 to 04th -May-2023, in order to cover the risks during the ongoing operating period. The sub-stations are covered for risks of explosions, fire, earthquakes, floods, etc. via Industrial All Risk Policy (IAR policy) and sum insured against loss/damage of property is in line with the current value of the project (sub-stations are covered for the full reinstatement value). As transmission lines falls under the linear asset category for which getting insurance covering complete reinstatement value is difficult and unviable. DMTCL transmission lines are covered for loss limit of 50 Cr. (excluding Gandak river section towers, which are covered through SFSP policy separately) which seems sufficient under the present market scenario and industry practice. Copies of the Insurance policies has been shared with Lead LTTC after renewal. The list of insurances taken are as below:

Table 15: List of Insurance Policies

S. No	Coverages	Policy Period
1.	IAR policy for Substations	05th-May-2022 to 04th -May-2023
2.	IAR policy for Transmission lines (excluding 16 towers in the Gandak river section of LILO Barh Motihari Gorakhpur line)	05th -May-2022 to 04th -May-2023
3.	SFSP policy for 16 towers in the Gandak river section of LILO Barh Motihari Gorakhpur line excluding STFI perils	05th -May-2022 to 04th -May-2023
4.	Burglary and Theft Policy for Transmission lines	05th -May-2022 to 04th -May-2023
5.	RSMD policy including Terrorism coverage	10th-Jun-2022 to 09th-Jun-2023

17.0 CONCLUSION:

- The company has obtained all necessary statutory clearances like, approval under Section 68 of the Electricity Act, Authorization under Section 164 of the Electricity Act, Grant of Transmission Licence by CERC, Route approval by PTCC, Electrical Safety Clearance of CEA for construction, commissioning and operation of the assets at its rated voltage. The company has a robust system of tracking compliances through the Komrisk application and regular review of the same by the Management
- The system has been constructed as per CEA and relevant Indian Standards.
- Mandatory spares for transmission lines are maintained by DMCTL. In case of consumption of spares, the same are being replenished by DMCTL. Also, DMTCL has a framework contract with tower vendors for purchase of towers on as and when required basis. Also, DMTCL has good relationships with ERS supplier company based in Kolkata which can supply ERS on urgent basis on a short span of time. This ensures that there is no need to block capex on ERS.
- Prudent procedures and good practices for safety are followed during construction, testing, operation and maintenance. The company has benchmarked its standards with global best practices by securing ISO14001 and ISO 45001, ISO 27001 and 55001 accreditation.
- The availability of DMTCL has been reviewed and it has been observed that DMTCL has managed to secure an average availability of more than 99.75% since commissioning of the project and more than 99.976% for FY21-22. As per TSA, the target availability for claiming full transmission charges is 98% and maximum permissible limit for availing annual incentive is 99.75%.
- As per TSA, the life of the project is required to be 35 years. However, with proper maintenance, the life of project can be extended up to 50 years.
- Well documented SOPs which are implemented by competent team of DMTCL under supervision and guidance of Senior Management team has ensured continued reliable asset management.

Based on above study, it is observed that all the project established is compliant to all technical, statutory, regulatory requirements and being operated & maintained with highest technical and safety standards by competent personnel in line with statutory requirements and regulations and as per good industrial practices.