



**Procurement of Plant Design, Supply, Delivery, Installation, Testing and
Commissioning of
Lot 1: 400 kV Ratmate Substation and works at Lapsipedi and New
Hetauda Substations
Lot 2: 400 kV
New Butwal Substation
Lot 3: 400 kV New Damauli Substation**

MCA-N/ETP/CB/004

ADDENDUM #7

Issued on: 17 August 2023

This Addendum No. 7 modifies respective portions of the Bidding Document issued on 24 March 2023 and amended through Addendum No. 1 on 04 April 2023, Addendum No. 2 on 30 May 2023, Addendum No. 3 on 06 June 2023, Addendum No. 4 on 10 July 2023, Addendum No. 5 on 12 July 2023, Addendum No. 6 on 18 July 2023. The changes, as indicated below, are effective on the date of issuance of this Addendum.

Except as expressly amended by this Addendum, all other terms and conditions of the Bidding Document - issued on 24 March 2023 and amended through Addendum No. 1 issued on 04 April 2023, Addendum No. 2 on 30 May 2023, Addendum No. 3 on 06 June 2023, Addendum No. 4 on 10 July 2023, Addendum No. 5 on 12 July 2023, Addendum No. 6 on 18 July 2023 remains unchanged and shall remain in full force and effect in accordance with their terms.

SN	Pages/Paragraph	Amendments
1.	Part 2, Section V, B12_TS, 220913_Lot2_NBW_T S, B1.2 Technical Specifications, Chapter 9: Civil Works, Section 1: General Civil Works Specification, Page-27 (Word Page 382 of 732), 15. River Protection Works	<p>15. RIVER PROTECTION WORKS</p> <p>15.1. SCOPE OF WORK</p> <p>The Contractor shall conduct a hydrological study of the natural drainage systems within 500 meters upstream and at least 2 km downstream of each substation boundary and carry out a flood risk assessment for 200-year return period. This shall include rivers and streams that may undercut the site, as well as those that may flood the site from upslope. Seasonal and perennial watercourses must all be addressed. The Contractor shall consider the risk of change in hydrology of the natural drainage systems due to the construction of river and stream protection works, and also the mitigation measures necessary to ensure that they can be built without disturbing the riparian and aquatic environments. The designs must therefore include a detailed sequential construction plan, complete with its own detailed environmental management plan.</p>

		<p>Based on the findings of the study, the Contractor shall design suitable river protection works for the parts of the substation allocated to ETP infrastructure. The designs of these works must be integrated with similar parallel activities by other parties, and the works must be implemented in tandem so as to ensure full flood protection for the entire site before the commissioning of the ETP components. The Contractor's designs must be included in the environmental review of substation drainage protection as required in clause 15.2. The Engineer will review the study, the designs and the environmental review and may request revisions before approving the construction of the protection works. The Contractor must not commence site works until approval has been granted.</p> <p>15.2. ENVIRONMENTAL REVIEW OF RIVER PROTECTION AND DRAINAGE</p> <p>The Contractor shall undertake an Environmental Review of the needs and likely effects of protection measures for rivers and other watercourses, and for drainage works for the substation and its surroundings. The review must be undertaken to international standards as required by MCC's Environmental Guidelines and may need to be developed as an addendum to the project's Environmental Impact Assessment or Environmental and Social Impact Assessment. This work will be implemented by competent professional staff approved by the Engineer following submission of curricula vitae. As a minimum, they must consist of:</p> <ul style="list-style-type: none"> a. A geomorphologist or physical geographer; b. A hydrologist; c. A meteorologist; and d. A biologist. <p>All consultants must have relevant bachelor's and master's degrees and at least ten years of relevant postgraduate professional work experience.</p> <p>The review team will undertake the following tasks:</p> <ul style="list-style-type: none"> a. Undertake an initial site visit to the substation to gather facts and scope the work. The minimum area to be covered in the review will be the substation area plus a zone extending 500 meters all round, and at least 2 km downstream. The assessment will need to evaluate catchment conditions which may necessitate extending the area beyond these limits. b. Review the Contractor's proposed designs for river and watercourse protection works, and drainage systems, both on and off the substation site. c. Present a detailed methodology for the study, explaining how it will be undertaken. If there is evidence that the proposed works will have impacts on the socio-economic environment, then a professional of the relevant discipline and of equal standing to the rest of the team must be co-opted to join the team. The methodology will be subject to the approval of the Engineer in
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SN	Pages/Paragraph	Amendments
		<p>consultation with the Environmental and Social Protection team of the Client.</p> <p>d. Undertake the fieldwork, making careful mapping of the land and its features, watercourses and natural drainage lines, and the proposed drainage discharge points.</p> <p>e. Model or review the models developed by the Contractor’s civil engineering design team, to assess the likely flows in the watercourses and drainage systems.</p> <p>f. Undertake a detailed assessment of likely environmental impacts of the proposed river protection and drainage systems, focusing on the effects on both the physical environment and the biological environment.</p> <p>g. Devise a schedule of mitigation measures required to safeguard the environment in the event that potential environmental impacts occur. Propose ways in which these can be integrated into the project’s overall Environmental, Social, Health and Safety Management Plan (ESHSM), providing detailed protocols and guidelines as necessary.</p> <p>h. Present a report that records all of the above, for the consideration of the Engineer. If necessary, the report must be modelled to provide an addendum to the project’s Environmental Impact Assessment or Environmental and Social Impact Assessment.</p> <p>i. Modify and finalize the report following the review by the Engineer in consultation with the Environmental and Social Protection team of the Client.</p> <p>has been replaced by</p> <p>The content stated under Attachment #1 to this Addendum.</p>

SN	Pages/Paragraph	Amendments					
		S. No.	Parameter	Unit	Data		Comments
					Required	Offered	
2.	Part 1, Section IV, Form Tech-11: Technical Data Schedule, Lot 1- Technical Data Schedule, 1. Autotransformer Specifications, Page-7, 25.	Online dissolved gas and moisture device (DGA Monitoring)					
		25.	Manufacturer		GE-HYDRAN M2 or equivalent		
		has been replaced by:					
		Online dissolved gas and moisture device (DGA Monitoring)					
		25.	Manufacturer		H ₂ , CH ₄ , C ₂ H ₆ , C ₂ H ₄ , CO, C ₂ H ₂ , CO ₂ , O ₂ (Optional) & H ₂ O		
3.	Part 1, Section IV, Form Tech-11: Technical Data Schedule, Lot 2- Technical Data Schedule, 1. Autotransformer Specifications, Page-7, 25.	Online dissolved gas and moisture device (DGA Monitoring)					
		40.	Manufacturer		GE-HYDRAN M2 or equivalent		
		has been replaced by:					
		Online dissolved gas and moisture device (DGA Monitoring)					
		40.	Manufacturer		H ₂ , CH ₄ , C ₂ H ₆ , C ₂ H ₄ , CO, C ₂ H ₂ , CO ₂ , O ₂ (Optional) & H ₂ O		
4.	Part 1, Section IV, Form Tech-11: Technical Data Schedule, Lot 3- Technical Data Schedule, 1. Autotransformer Specifications, Page-7, 25.	Online dissolved gas and moisture device (DGA Monitoring)					
		25.	Manufacturer		GE-HYDRAN M2 or equivalent		
		has been replaced by:					
		Online dissolved gas and moisture device (DGA Monitoring)					
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5.	Part 2, Section V, B01_GPD, Annex_B01	Add a new Annex, Annex B01-14-Power Quality & Energy Meter: Please consider Annex B01-14-Power Quality & Energy Meter (attached as Attachment#2 to this addendum) for additional information.					

SN	Pages/Paragraph	Amendments
6.	Part 2, Section V, B11_PSR, Lot3_NDM_DWG, B1.1, Project Specific Requirements (PSR), System_DWG,	<p>NDM-200-1-Rev 7 NDM-210-1-Rev 5</p> <p>has been replaced by: NDM-200-1-Rev 8 NDM-210-1-Rev 6</p> <p>The files are included as Attachment#3 to this addendum.</p>
7.	Part 2, Section V, B11_PSR, 221123_Lot3_NDM_PSR, B1.1, Project Specific Requirements (PSR), 3. Detailed Scope of Work, Page-14, 3.1.2 220kV New Damauli Substation	<p>3.1.2 220 kV New Damauli Substation</p> <p>a. The 220 kV GIS substation is generally NOT included in the scope of this project. Supply, installation, testing, and commissioning of all equipment including control and protection panels and automation systems shall be others' responsibility. However, overall Earthing and Land Development work for the entire substation area covering 400 kV and 220 kV side shall be included in the present scope of work.</p> <p>has been replaced by:</p> <p>3.1.2 220 kV New Damauli Substation</p> <p>a. The 220 kV GIS substation is generally NOT included in the scope of this project. Supply, installation, testing, and commissioning of all equipment including control and protection panels and automation systems shall be others' responsibility. However, extension of Earthing and Site Development Works in the 400kV side of the switchyard up to and excluding the 220kV side shall be included in the present scope of work.</p>
8.	Part 2, Section V, B12_TS, 220913_Lot1_RAT_TS, B1.2 Technical Specifications, Chapter 3: Auto-Transformer Specification, 3. Construction Details, Page-25 (word page 301 of 841), 3.8 Cooling Equipment.	<p>3.8. COOLING EQUIPMENT</p> <p>a. Cooling Equipment</p> <p>ii. Winding temperature rise by resistance shall not exceed 65° C and hottest spot winding temperature rise shall not exceed 80° C for the full range of transformer operation.</p> <p>has been replaced by:</p> <p>3.8. COOLING EQUIPMENT</p> <p>a. Cooling Equipment</p> <p>ii. Winding temperature rise by resistance shall not exceed 55° C and hottest spot winding temperature rise shall not exceed 90° C for the full range of transformer operation.</p>
9.	Part 2, Section V, B12_TS, 220913_Lot1_NBW_TS, B1.2 Technical Specifications, Chapter 3: Auto-Transformer Specification, 3. Construction Details, Page-25 (word page 188	<p>3.8. COOLING EQUIPMENT</p> <p>a. Cooling Equipment</p> <p>ii. Winding temperature rise by resistance shall not exceed 65° C and hottest spot winding temperature rise shall not exceed 80° C for the full range of transformer operation.</p> <p>has been replaced by:</p>

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	of 732), 3.8 Cooling Equipment.	<p>3.8. COOLING EQUIPMENT</p> <p>a. Cooling Equipment</p> <p>ii. Winding temperature rise by resistance shall not exceed 55° C and hottest spot winding temperature rise shall not exceed 90° C for the full range of transformer operation.</p>
10.	Part 2, Section V, B12_TS, 220913_Lot3_NDM_T S, B1.2 Technical Specifications, Chapter 3: Auto-Transformer Specification, 3. Construction Details, Page-24 (word page 190 of 741), 3.8 Cooling Equipment.	<p>3.8. COOLING EQUIPMENT</p> <p>a. Cooling Equipment</p> <p>ii. Winding temperature rise by resistance shall not exceed 65° C and hottest spot winding temperature rise shall not exceed 80° C for the full range of transformer operation.</p> <p>has been replaced by:</p> <p>3.8. COOLING EQUIPMENT</p> <p>a. Cooling Equipment</p> <p>ii. Winding temperature rise by resistance shall not exceed 55° C and hottest spot winding temperature rise shall not exceed 90° C for the full range of transformer operation.</p>
11.	Part 2, Section V, B12_TS, 220913_Lot1_RAT_TS, B1.2 Technical Specifications, Chapter 3: Auto-Transformer Specification, 5. Inspection and Testing, Page-48 (word page 324 of 841), 5.2 Factory Tests	<p>5.2 Factory Tests</p> <p>* Type test shall be carried out on the first unit manufactured on this contract at each manufacturing plant.</p> <p>c. Type Tests on fittings: All the following fittings shall conform to type tests and the type test reports shall be furnished by the contractor along with the drawings of equipment/fittings. The list of fittings and the type test requirement is:</p> <p>i. Bushing (Type Test per IEC 60137, including snap back/seismic test)</p> <p>has been replaced by:</p> <p>* Type test shall be carried out on the first unit manufactured on this contract at each manufacturing plant.</p> <p>c. Type Tests on fittings: All the following fittings shall conform to type tests and the type test reports shall be furnished by the contractor along with the drawings of equipment/fittings. Type test report for transformer fittings & accessories should not be more than 5 years old. The list of fittings and the type test requirement is:</p> <p>i. Bushing (Type Test as per IEC:60137 including Snap back & Seismic test for 400 kV and above voltage class bushing)</p>
12.	Part 2, Section V, B12_TS, 220913_Lot2_NBW_T S, B1.2 Technical Specifications, Chapter 3: Auto-Transformer Specification, 5. Inspection and Testing, Page-48 (word page 211 of 732), 5.2 Factory Tests	<p>5.2 Factory Tests</p> <p>* Type test shall be carried out on the first unit manufactured on this contract at each manufacturing plant.</p> <p>c. Type Tests on fittings: All the following fittings shall conform to type tests and the type test reports shall be furnished by the contractor along with the drawings of equipment/fittings. The list of fittings and the type test requirement is:</p> <p>i. Bushing (Type Test per IEC 60137, including snap back/seismic test)</p> <p>has been replaced by:</p> <p>* Type test shall be carried out on the first unit manufactured on this contract at each manufacturing plant.</p>

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13.	<p>Part 2, Section V, B12_TS, 220913_Lot3_NDM_T S, B1.2 Technical Specifications, Chapter 3: Auto-Transformer Specification, 5. Inspection and Testing, Page-47 (word page 213 of 741), 5.2 Factory Tests</p>	<p>5.2 Factory Tests</p> <p>* Type test shall be carried out on the first unit manufactured on this contract at each manufacturing plant.</p> <p>c. Type Tests on fittings: All the following fittings shall conform to type tests and the type test reports shall be furnished by the contractor along with the drawings of equipment/fittings. The list of fittings and the type test requirement is:</p> <p>i. Bushing (Type Test per IEC 60137, including snap back/seismic test)</p> <p>has been replaced by:</p> <p>* Type test shall be carried out on the first unit manufactured on this contract at each manufacturing plant.</p> <p>c. Type Tests on fittings: All the following fittings shall conform to type tests and the type test reports shall be furnished by the contractor along with the drawings of equipment/fittings. Type test report for transformer fittings & accessories should not be more than 5 years old. The list of fittings and the type test requirement is:</p> <p>i. Bushing (Type Test as per IEC:60137 including Snap back & Seismic test for 400 kV and above voltage class bushing)</p>																																																
14.	<p>Part 2, Section V, B12_TS, 220913_Lot1_RAT_TS, B1.2 Technical Specifications, Chapter 4: LV Switchgear Specification, 2. LT Transformer, Page-23 (Word Page 355 of 841), 2.9 Spare Parts</p>	<p>Add 2.10 TECHNICAL SPECIFICATIONS at the end of 2.9 SPARE PARTS, which is amended to read as follows:</p> <p>2.10 TECHNICAL SPECIFICATIONS</p> <table border="1" data-bbox="587 1335 1386 2002"> <thead> <tr> <th data-bbox="587 1335 687 1386">S No</th> <th data-bbox="687 1335 1086 1386">Description</th> <th data-bbox="1086 1335 1198 1386">Unit</th> <th data-bbox="1198 1335 1386 1386">Parameters</th> </tr> </thead> <tbody> <tr> <td data-bbox="587 1386 687 1442">1</td> <td data-bbox="687 1386 1086 1442">Rated Capacity</td> <td data-bbox="1086 1386 1198 1442">kVA</td> <td data-bbox="1198 1386 1386 1442">630</td> </tr> <tr> <td data-bbox="587 1442 687 1498">2</td> <td data-bbox="687 1442 1086 1498">Rated Voltage</td> <td data-bbox="1086 1442 1198 1498"></td> <td data-bbox="1198 1442 1386 1498"></td> </tr> <tr> <td data-bbox="587 1498 687 1554">a)</td> <td data-bbox="687 1498 1086 1554">HV</td> <td data-bbox="1086 1498 1198 1554">kV</td> <td data-bbox="1198 1498 1386 1554">33</td> </tr> <tr> <td data-bbox="587 1554 687 1610">b)</td> <td data-bbox="687 1554 1086 1610">LV</td> <td data-bbox="1086 1554 1198 1610">kV</td> <td data-bbox="1198 1554 1386 1610">0.4</td> </tr> <tr> <td data-bbox="587 1610 687 1666">3</td> <td data-bbox="687 1610 1086 1666">Type of Winding</td> <td data-bbox="1086 1610 1198 1666"></td> <td data-bbox="1198 1610 1386 1666">Two Winding</td> </tr> <tr> <td data-bbox="587 1666 687 1722">4</td> <td data-bbox="687 1666 1086 1722">Service</td> <td data-bbox="1086 1666 1198 1722"></td> <td data-bbox="1198 1666 1386 1722">Outdoor</td> </tr> <tr> <td data-bbox="587 1722 687 1778">5</td> <td data-bbox="687 1722 1086 1778">No of Phases</td> <td data-bbox="1086 1722 1198 1778">No.</td> <td data-bbox="1198 1722 1386 1778">Three</td> </tr> <tr> <td data-bbox="587 1778 687 1834">6</td> <td data-bbox="687 1778 1086 1834">Frequency</td> <td data-bbox="1086 1778 1198 1834">Hz</td> <td data-bbox="1198 1778 1386 1834">50</td> </tr> <tr> <td data-bbox="587 1834 687 1890">7</td> <td data-bbox="687 1834 1086 1890">Type of Cooling</td> <td data-bbox="1086 1834 1198 1890"></td> <td data-bbox="1198 1834 1386 1890">ONAN</td> </tr> <tr> <td data-bbox="587 1890 687 1946">8</td> <td data-bbox="687 1890 1086 1946">Impedance at 75 Deg C</td> <td data-bbox="1086 1890 1198 1946">%</td> <td data-bbox="1198 1890 1386 1946">5</td> </tr> <tr> <td data-bbox="587 1946 687 2002">9</td> <td data-bbox="687 1946 1086 2002">Tolerance on Impedance</td> <td data-bbox="1086 1946 1198 2002">%</td> <td data-bbox="1198 1946 1386 2002">±10</td> </tr> </tbody> </table>	S No	Description	Unit	Parameters	1	Rated Capacity	kVA	630	2	Rated Voltage			a)	HV	kV	33	b)	LV	kV	0.4	3	Type of Winding		Two Winding	4	Service		Outdoor	5	No of Phases	No.	Three	6	Frequency	Hz	50	7	Type of Cooling		ONAN	8	Impedance at 75 Deg C	%	5	9	Tolerance on Impedance	%	±10
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SN	Pages/Paragraph	Amendments			
		10	Duty		Continuous
		11	Overload		IEC:60076-7
		12	Max. Temp. Rise over an ambient of 50 Deg C		
		a)	Oil (Temperature rise measurement by thermometer)	°C	50
		b)	Winding Temperature rise measurement by resistance method)	°C	55
		13	Windings		
		a)	System Apparent Short circuit level (kA)		As per IEC: 60076-Part 1
		b)	Winding Connection		
		(i)	HV		Delta
		(ii)	LV		Star
		14	Vector Group		Dyn1
		15	Insulation		Uniform
		16	Insulation Level	kVrms	
		a)	Power Frequency Test Level		
		(i)	HV	kVrms	95
		(ii)	LV	kVrms	2
		17	Basic Impulse Level		
		(i)	HV	kVp	250
		(ii)	LV	kVp	-
		18	Highest voltage (kV) for each winding	kV	52
		19	Method of earthing		Solidly earthed
		20	Tap changer		
		a)	(i) Tap Change		+5% to -10% in step of 2.5% on HV side
		b)	(ii) Tap control		Off Circuit Tap Change Switch
		21	HV Bushing		
		a)	Rated Voltage	kV	52
		b)	Rated current	A	100
		c)	Basic Impulse Level (kVp)	kVp	250

SN	Pages/Paragraph	Amendments			
		d)	Wet & Dry Power frequency Withstand Voltage	kVrms	95
		e)	Min. Total Creepage Distance	mm	1300
		f)	Mounting		Tank / Transformer Body
		22	LV & Neutral Bushing		
		a)	Rated Voltage	kV	1.1
		b)	Rated current	A	1000
		c)	Basic Impulse Level (kVp)	kVp	-
		d)	Wet & Dry Power frequency Withstand Voltage	kVrms	2
		e)	Mounting		Tank / Transformer Body
		23	Terminal Details		
		a)	HV		Suitable for 33kV Cable or Over Head Conductor
		b)	LV & Neutral		Cable Box
		24	Min. Clearance in Air	mm	
		a)	Ph-Ph (HV/LV)	mm	530/25
		b)	Ph-Earth (HV/LV)	mm	480/25
15.	Part 2, Section V, B12_TS, 220913_Lot2_NBW_T S, B1.2 Technical Specifications, Chapter 4: LV Switchgear Specification, 2. LT Transformer, Page-23 (Word Page 243 of 732), 2.9 Spare Parts	Add 2.10 TECHNICAL SPECIFICATIONS at the end of 2.9 SPARE PARTS, which is amended to read as follows:			
		2.10 TECHNICAL SPECIFICATIONS			
		S No	Description	Unit	Parameters
		1	Rated Capacity	kVA	630
		2	Rated Voltage		
		a)	HV	kV	33
		b)	LV	kV	0.4
		3	Type of Winding		Two Winding
		4	Service		Outdoor
		5	No of Phases	No.	Three
		6	Frequency	Hz	50
		7	Type of Cooling		ONAN
		8	Impedance at 75 Deg C	%	5
		9	Tolerance on Impedance	%	±10

SN	Pages/Paragraph	Amendments			
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		14	Vector Group		Dyn1
		15	Insulation		Uniform
		16	Insulation Level	kVrms	
		a)	Power Frequency Test Level		
		(i)	HV	kVrms	95
		(ii)	LV	kVrms	2
		17	Basic Impulse Level		
		(i)	HV	kVp	250
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		18	Highest voltage (kV) for each winding	kV	52
		19	Method of earthing		Solidly earthed
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		a)	(i) Tap Change		+5% to -10% in step of 2.5% on HV side
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		c)	Basic Impulse Level (kVp)	kVp	250

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16.	Part 2, Section V, B12_TS, 220913_Lot3_NDM_T S, B1.2 Technical Specifications, Chapter 4: LV Switchgear Specification, 2. LT Transformer, Page-23 (Word Page 244 of 741), 2.9 Spare Parts	Add 2.10 TECHNICAL SPECIFICATIONS at the end of 2.9 SPARE PARTS, which is amended to read as follows:																																																			
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<table border="1"> <thead> <tr> <th data-bbox="584 1364 687 1420">S No</th> <th data-bbox="687 1364 1086 1420">Description</th> <th data-bbox="1086 1364 1198 1420">Unit</th> <th data-bbox="1198 1364 1401 1420">Parameters</th> </tr> </thead> <tbody> <tr> <td data-bbox="584 1420 687 1476">1</td> <td data-bbox="687 1420 1086 1476">Rated Capacity</td> <td data-bbox="1086 1420 1198 1476">kVA</td> <td data-bbox="1198 1420 1401 1476">630</td> </tr> <tr> <td data-bbox="584 1476 687 1532">2</td> <td data-bbox="687 1476 1086 1532">Rated Voltage</td> <td data-bbox="1086 1476 1198 1532"></td> <td data-bbox="1198 1476 1401 1532"></td> </tr> <tr> <td data-bbox="584 1532 687 1588">a)</td> <td data-bbox="687 1532 1086 1588">HV</td> <td data-bbox="1086 1532 1198 1588">kV</td> <td data-bbox="1198 1532 1401 1588">33</td> </tr> <tr> <td data-bbox="584 1588 687 1644">b)</td> <td data-bbox="687 1588 1086 1644">LV</td> <td data-bbox="1086 1588 1198 1644">kV</td> <td data-bbox="1198 1588 1401 1644">0.4</td> </tr> <tr> <td data-bbox="584 1644 687 1700">3</td> <td data-bbox="687 1644 1086 1700">Type of Winding</td> <td data-bbox="1086 1644 1198 1700"></td> <td data-bbox="1198 1644 1401 1700">Two Winding</td> </tr> <tr> <td data-bbox="584 1700 687 1756">4</td> <td data-bbox="687 1700 1086 1756">Service</td> <td data-bbox="1086 1700 1198 1756"></td> <td data-bbox="1198 1700 1401 1756">Outdoor</td> </tr> <tr> <td data-bbox="584 1756 687 1812">5</td> <td data-bbox="687 1756 1086 1812">No of Phases</td> <td data-bbox="1086 1756 1198 1812">No.</td> <td data-bbox="1198 1756 1401 1812">Three</td> </tr> <tr> <td data-bbox="584 1812 687 1868">6</td> <td data-bbox="687 1812 1086 1868">Frequency</td> <td data-bbox="1086 1812 1198 1868">Hz</td> <td data-bbox="1198 1812 1401 1868">50</td> </tr> <tr> <td data-bbox="584 1868 687 1924">7</td> <td data-bbox="687 1868 1086 1924">Type of Cooling</td> <td data-bbox="1086 1868 1198 1924"></td> <td data-bbox="1198 1868 1401 1924">ONAN</td> </tr> <tr> <td data-bbox="584 1924 687 1980">8</td> <td data-bbox="687 1924 1086 1980">Impedance at 75 Deg C</td> <td data-bbox="1086 1924 1198 1980">%</td> <td data-bbox="1198 1924 1401 1980">5</td> </tr> <tr> <td data-bbox="584 1980 687 2036">9</td> <td data-bbox="687 1980 1086 2036">Tolerance on Impedance</td> <td data-bbox="1086 1980 1198 2036">%</td> <td data-bbox="1198 1980 1401 2036">±10</td> </tr> </tbody> </table>						S No	Description	Unit	Parameters	1	Rated Capacity	kVA	630	2	Rated Voltage			a)	HV	kV	33	b)	LV	kV	0.4	3	Type of Winding		Two Winding	4	Service		Outdoor	5	No of Phases	No.	Three	6	Frequency	Hz	50	7	Type of Cooling		ONAN	8	Impedance at 75 Deg C	%	5	9	Tolerance on Impedance	%	±10
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SN	Pages/Paragraph	Amendments		
		10	Duty	Continuous
		11	Overload	IEC:60076-7
		12	Max. Temp. Rise over an ambient of 50 Deg C	
		a)	Oil (Temperature rise measurement by thermometer)	°C 50
		b)	Winding Temperature rise measurement by resistance method)	°C 55
		13	Windings	
		a)	System Apparent Short circuit level (kA)	As per IEC: 60076-Part 1
		b)	Winding Connection	
		(i)	HV	Delta
		(ii)	LV	Star
		14	Vector Group	Dyn1
		15	Insulation	Uniform
		16	Insulation Level	kVrms
		a)	Power Frequency Test Level	
		(i)	HV	kVrms 95
		(ii)	LV	kVrms 2
		17	Basic Impulse Level	
		(i)	HV	kVp 250
		(ii)	LV	kVp -
		18	Highest voltage (kV) for each winding	kV 52
		19	Method of earthing	Solidly earthed
		20	Tap changer	
		a)	(i) Tap Change	+5% to -10% in step of 2.5% on HV side
		b)	(ii) Tap control	Off Circuit Tap Change Switch
		21	HV Bushing	
		a)	Rated Voltage	kV 52
		b)	Rated current	A 100
		c)	Basic Impulse Level (kVp)	kVp 250

SN	Pages/Paragraph	Amendments			
		d)	Wet & Dry Power frequency Withstand Voltage	kVrms	95
		e)	Min. Total Creepage Distance	mm	1300
		f)	Mounting		Tank / Transformer Body
		22	LV & Neutral Bushing		
		a)	Rated Voltage	kV	1.1
		b)	Rated current	A	1000
		c)	Basic Impulse Level (kVp)	kVp	-
		d)	Wet & Dry Power frequency Withstand Voltage	kVrms	2
		e)	Mounting		Tank / Transformer Body
		23	Terminal Details		
		a)	HV		Suitable for 33kV Cable or Over Head Conductor
		b)	LV & Neutral		Cable Box
		24	Min. Clearance in Air	mm	
		a)	Ph-Ph (HV/LV)	mm	530/25
		b)	Ph-Earth (HV/LV)	mm	480/25

SN	Pages/Paragraph	Amendments														
17.	Part 1: Page 2, Specific Procurement Notice (SPN), Submission Deadline, Addenda 3 and 5 of the Bidding Document	<p>04 September 2023</p> <p>has been replaced by:</p> <p>05 October 2023</p>														
18.	Part 1: Page 3, Specific Procurement Notice (SPN), Addenda 3 and 5 of the Bidding Document	<p>Bids must be delivered to the address below on or before 13:00 hours (local time of Nepal (GMT+5:45)) on 04 September 2023. Electronic bidding will not be permitted. Late bids will be rejected. Bids will be publicly opened in the presence of the bidders' designated representatives and anyone who choose to attend at the address below on 04 September 2023 at 13:00 hours (local time of Nepal (GMT+5:45)). All bids shall be accompanied by a <i>Bid Security</i> in the amount of US\$425,000 for Lot 1, US\$260,000 for Lot 2 and US\$270,000 for Lot 3 and it shall be valid until 29 May 2024.</p> <p>Contact information:</p> <table border="1" data-bbox="448 898 1541 1249"> <tr> <td data-bbox="448 898 810 1066">The address(es) referred to above is (are):</td> <td data-bbox="815 898 1541 1066">The specific location/venue for submission of bids will be timely notified to all registered bidders via email and posted at MCA-Nepal web page.</td> </tr> <tr> <td data-bbox="448 1066 810 1128">Attn:</td> <td data-bbox="815 1066 1541 1128">Procurement Agent</td> </tr> <tr> <td data-bbox="448 1128 810 1191">E-mail:</td> <td data-bbox="815 1128 1541 1191">MCANepalPA@dt-global.com</td> </tr> <tr> <td data-bbox="448 1191 810 1249">Website:</td> <td data-bbox="815 1191 1541 1249">https://mcanp.org/</td> </tr> </table> <p>has been replaced by:</p> <p>Bids must be delivered to the address below on or before 13:00 hours (local time of Nepal (GMT+5:45)) on 05 October 2023. Electronic bidding will not be permitted. Late bids will be rejected. Bids will be publicly opened in the presence of the bidders' designated representatives and anyone who choose to attend at the address below on 05 October 2023 at 13:00 hours (local time of Nepal (GMT+5:45)). All bids shall be accompanied by a <i>Bid Security</i> in the amount of US\$425,000 for Lot 1, US\$260,000 for Lot 2 and US\$270,000 for Lot 3 and it shall be valid until 29 June 2024.</p> <p>Contact information:</p> <table border="1" data-bbox="448 1749 1541 2038"> <tr> <td data-bbox="448 1749 810 1917">The address(es) referred to above is (are):</td> <td data-bbox="815 1749 1541 1917">The specific location/venue for submission of bids will be timely notified to all registered bidders via email and posted at MCA-Nepal web page.</td> </tr> <tr> <td data-bbox="448 1917 810 1980">Attn:</td> <td data-bbox="815 1917 1541 1980">Procurement Agent</td> </tr> <tr> <td data-bbox="448 1980 810 2038">E-mail:</td> <td data-bbox="815 1980 1541 2038">MCANepalPA@dt-global.com</td> </tr> </table>	The address(es) referred to above is (are):	The specific location/venue for submission of bids will be timely notified to all registered bidders via email and posted at MCA-Nepal web page.	Attn:	Procurement Agent	E-mail:	MCANepalPA@dt-global.com	Website:	https://mcanp.org/	The address(es) referred to above is (are):	The specific location/venue for submission of bids will be timely notified to all registered bidders via email and posted at MCA-Nepal web page.	Attn:	Procurement Agent	E-mail:	MCANepalPA@dt-global.com
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Attn:	Procurement Agent															
E-mail:	MCANepalPA@dt-global.com															

		Website:	https://mcanp.org/
19.	Part 1: Page 47 & 48, Section II. Bid Data Sheet, ITB 8.1, Addenda 3 and 5 of the Bidding Document	<p>To request clarification of this Bidding Document only, the Employer's address is: Attention: Procurement Agent of Millennium Challenge Account Nepal Address: 2nd& 3rd Floor, East Wing, Lal Durbar Convention Centre, Yak & Yeti Complex, Durbar Marg, Kathmandu <u>Nepal</u> Email: MCANepalPA@dt-global.com</p> <p>Clarifications may be requested by e-mail not later than 52 days (14 July 2023) before the deadline for Bid submission, so that responses to the last set of requests for clarifications received can be issued to all Bidders not later than 31 days (04 August 2023) before the deadline for Bid submission.</p> <p>has been replaced by:</p> <p>To request clarification of this Bidding Document only, the Employer's address is: Attention: Procurement Agent of Millennium Challenge Account Nepal Address: 2nd& 3rd Floor, East Wing, Lal Durbar Convention Centre, Yak & Yeti Complex, Durbar Marg, Kathmandu <u>Nepal</u> Email: MCANepalPA@dt-global.com</p> <p>Clarifications may be requested by e-mail not later than 45 days (21 August 2023) before the deadline for Bid submission, so that responses to the last set of requests for clarifications received can be issued to all Bidders not later than 30 days (05 September 2023) before the deadline for Bid submission.</p>	
20.	Part 1: Page 52, Section II. Bid Data Sheet, ITB 19.1, Addenda 3 and 5 of the Bidding Document	<p>The Bid validity period shall be 240 days, until 01 May 2024.</p> <p>Has been replaced by:</p> <p>The Bid validity period shall be 240 days, until 01 June 2024.</p>	
21.	Part 1: Page 53, Section II. Bid Data Sheet, ITB 23.1, Addenda 3 and 5 of the Bidding Document	<p>The address for Bid submission is: Attention: Procurement Agent of Millennium Challenge Account Nepal The specific location/venue for submission of bids will be timely notified to all registered bidders and posted at MCA-Nepal web page.</p> <p>The deadline for Bid submission is: Date: <u>04 September 2023</u> Time: 13:00 hours (local time of Nepal (GMT+5:45))</p>	

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22.	Part 1: Page 53 & 54, Section II. Bid Data Sheet, ITB 26.1, Addenda 3 and 5 of the Bidding Document	<p>The Bid opening shall take place at: The specific location/venue for the bids opening will be timely notified to all registered bidders via email and posted at MCA-Nepal web page.</p> <p>Date: 04 September 2023 Time: 13:00 hours (local time of Nepal (GMT+5:45))</p> <p>has been replaced by:</p> <p>The Bid opening shall take place at: The specific location/venue for the bids opening will be timely notified to all registered bidders via email and posted at MCA-Nepal web page.</p> <p>Date: 05 October 2023 Time: 13:00 hours (local time of Nepal (GMT+5:45))</p>

Attachment#1
Rivers Protection Works



15. River Protection
Works_NBW_F.pdf

15 RIVER PROTECTION WORKS

15.1 Scope of Works for Hydrological and Environmental Assessment of New Butwal Substation Area

The New Butwal Substation and the working area lie in Sunawal Municipality of Nawalparasi West district. The location of the substation is shown in the Google Imagery that follow (Figure 15-1).

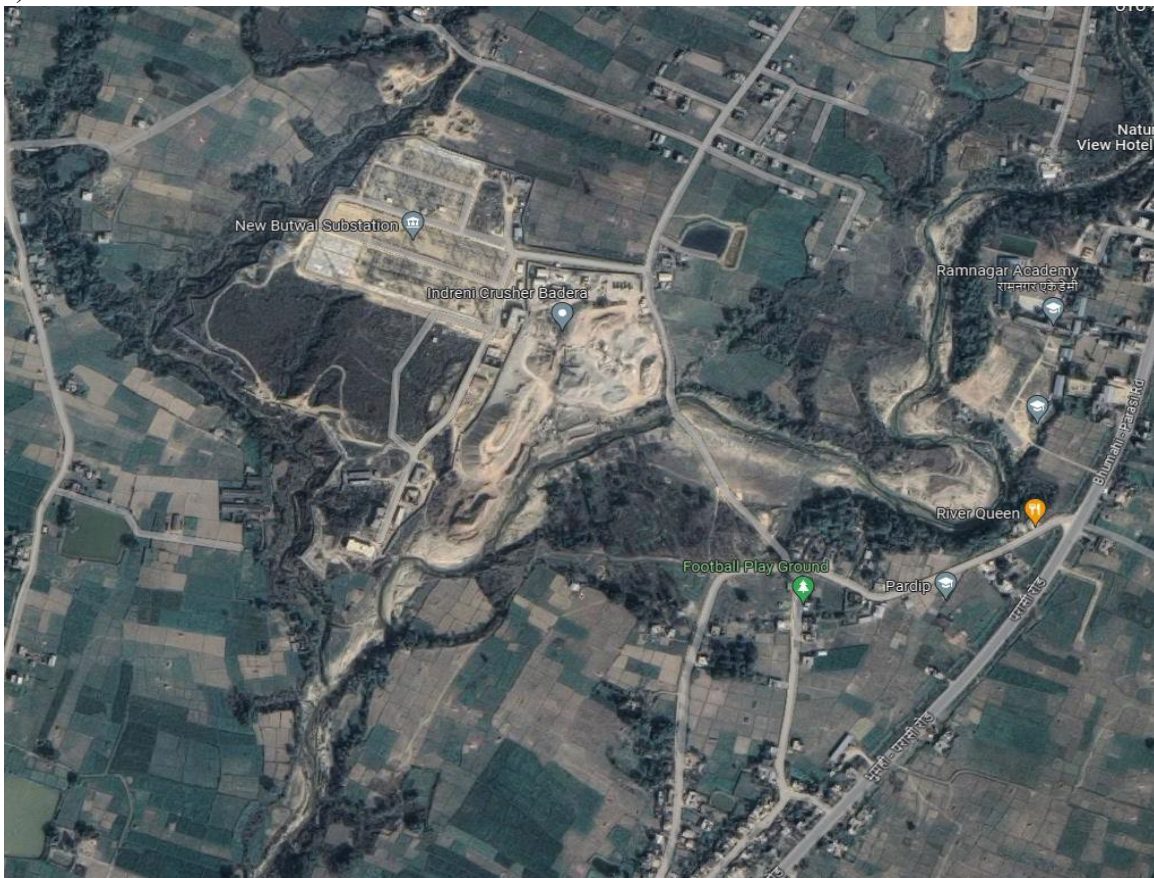


Figure 15-1: Google Image of Substation's Location

This substation complex has an area of 13.093 hectare and is surrounded by approximately 2.5m high brick masonry boundary wall all around. 220/132 kV substation of Nepal Electricity Authority lies on the northern side of the complex. This substation is under operation for last three years. Bhumahi River passes in the vicinity of the eastern boundary of the complex. In addition, another small river also passes in the vicinity of the western boundary of the complex.

The Contractor shall investigate both the possible impacts of the local hydrological setting on the substation site, and the potential effects of the substation and any associated drainage and river protection works on the natural watercourses, riparian zones and neighboring land.

The Contractor shall conduct a detailed hydrological study of the natural drainage systems at least 500 meters all around the boundary of the New Butwal Substation and carry out a flood risk assessment for 200-year return period. This shall include rivers and streams that may undercut the site perimeter wall, as well as those that may flood the site from upslope. Seasonal and perennial watercourses must all be addressed. It must also specifically evaluate the sensitivity of the site to possible significant changes in irrigation practices and development over the next 50 years, along with the potential for more intense rainfall events as a result of climate change. The Contractor shall consider the risk of change in hydrology of the natural drainage systems due to the construction of river and stream protection works, both for the substation and for other possible nearby developments, and also the mitigation measures necessary to ensure that they can be built without disturbing the riparian and aquatic environments. The designs must therefore include a detailed sequential construction plan, complete with its own detailed environmental management plan.

Based on the findings of the study, if required, the Contractor shall design and construct suitable river protection works for the parts of the substation allocated to ETP infrastructure. The design of protection works should follow the environmental guidelines and environmental review that will be further reviewed by MCA-Nepal and MCC. The contractor shall be responsible to incorporate all the comments made by MCA-Nepal and MCC before the final design of the protection works.

The scope of works for Hydrological, and Environmental Assessment of New Butwal Substation Area are:

- Hydrological Study of the two small rivers near New Butwal Substation
- Environmental Assessment of two small rivers near New Butwal Substation Area

The contractor shall conduct following tasks:

15.1.1 Activity 1: Hydrological Study of the Bhumahi River and the small river near New Butwal Substation

15.1.1.1 Task 1: Topographical Survey and Mapping

Topographical survey and mapping of the river corridor including its tributaries at least 500 m from the substation all around the boundary of the New Butwal Substation at a 1:1000 scale with 0.5 m counter interval, along with river cross-sections at 25 m distance or wherever the river sections changes. Survey and cross-sections need to cover the ground level 1 m higher than the flood level at the time of 1:200 years flood.

Document visual soil classification (type and particle size) at each cross-section for use in erosion assessment.

15.1.1.2 Task 2: Hydrological Studies

❖ Sub Task 2.1

Review the locations of official and verified weather recording stations in the area around the river catchment and obtain the longest sequence possible of rainfall data that is most appropriate to the catchment, taking account of the topographic variations in the area. Compare data from nearby rain gauges to determine whether it is appropriate to add a multiplication factor to the extreme events recorded in the selected data set, in order to improve the representation of rainfall in the river headwaters.

❖ Sub Task 2.2

River discharge measurement of both rivers in the vicinity of the Substation area using the current meter for three different days. If at all possible, these must include measurements taken during the monsoon. Data on rainfall in recent days and weeks at the nearest available rain gauge station must also be obtained. If it is not possible to take monsoon season flow measurements during the study period, then the maximum flow in the previous monsoon should be calculated from a series of at least ten surveyed cross-sections of the highest flood levels in that season, as determined from evidence along the river banks.

❖ Sub Task 2.3

Conduct stream flow analysis of both rivers in the vicinity of the Substation area using a Regional Analysis approach and/or a better methodology.

❖ Sub Task 2.4

Carry out Flood frequency analysis up to 1:200 years return period flood of both rivers and its sub-basins using Regional Flood Frequency Analysis or Empirical Method and Catchment Correlation Method (Hydrologically similar catchment), Compare the different results and select the suitable method for New Butwal substation.

15.1.1.3 Task 3: River Flow Analysis

Prepare detailed data for HEC-RAS_2D model (Including but not limited to, Flood data, Manning's Roughness data, Bank Station data, etc.). Prepare a detailed model in HEC-RAS_2D. Perform simulations under two conditions for the projected 1:200 return period flood.

- a. Without river training structure but with permanent structure that are already built on the river course and flood plain.
 - Identify areas of potential bank erosion.
- b. With a river training structure on the bank of the river along the side of the substation and with a permanent structure that is already built on the river course and flood plain.
 - Perform simulations and prepare the reports of the results.

15.1.2 Environmental Assessment of River Protection and Drainage Works

The Contractor shall undertake an environmental assessment of the needs and likely effects of protection measures for rivers and other watercourses, and for drainage works for the substation and its surroundings. The assessment must be undertaken to international standards as required by MCC's Environmental Guidelines and may need to be developed as an addendum to the project's Environmental and Social Impact Assessment (ESIA).

The Contractor will undertake the following tasks:

- a. Undertake an initial site visit to the substation to gather facts and scope the work. The minimum area to be covered in the review will be the substation area plus a zone extending at least 500 m all round. The assessment will need to evaluate catchment conditions, which may necessitate extending the area well beyond these limits.
- b. Review the Contractor's proposed designs for river and watercourse protection works, and drainage systems, both on and off the substation site.

- c. Present a detailed methodology for the study, explaining how it will be undertaken. If there is evidence that the proposed works will have impacts on the socio-economic environment, then a professional of the relevant discipline and of equal standing to the rest of the team must be co-opted to join the team. The methodology will be subject to the approval of the Engineer in consultation with the Environmental and Social Performance team of the Client.
- d. Undertake the fieldwork, making careful mapping of the land and its features, watercourses and natural drainage lines, existing manmade drainage works, and the proposed drainage discharge points.
- e. Model or review the models developed by the Contractor's civil engineering design team, to assess the likely flows in the watercourses and drainage systems.
- f. Undertake a detailed assessment of likely environmental impacts of the proposed river protection and drainage systems, focusing on the effects on both the physical environment and the biological environment. Hence this assessment must cover the river itself, the riparian zone and land close to the river that could be eroded or flooded if the project's protection works alter the hydrological regime.
- g. Devise a schedule of mitigation measures required to safeguard the environment in the event that the potential environmental impacts occur. Propose ways in which these can be integrated into the project's overall Environmental, Social, Health and Safety Management Plan (ESHSMP), providing detailed protocols and guidelines as necessary.
- h. Present a report that records all of the above, for the consideration of the Engineer. If necessary, the report must be modelled to provide an addendum to the project's Environmental and Social Impact Assessment.
- i. Modify and finalize the report following the review by the Engineer in consultation with the Environmental and Social Performance team of the Client.

15.1.3 Study Team and Level of Effort

The study team shall comprise the following (note that some roles may be combined by suitably qualified individuals) experts with tentative level of efforts of each individual. These experts must have relevant bachelor's and master's degrees and at least ten years of relevant postgraduate professional work experience conduct the job as mentioned in the Scope of Works.

i.	Sr. Hydrologist	2.0 PM
ii.	Sr. Geomorphologist	0.5 PM
iii.	Sr. Civil Design Engineer	0.5 PM
iv.	Sr. Structural Engineer	0.5 PM
v.	Sr. Environmental Expert	2.0 PM
vi.	Aquatic Biologist	1.0 PM

15.1.4 Deliverables and Duration of Assignment

The contractor needs to prepare the following reports:

- a. Hydrological Report. This report consists of all activities that comes under Activity 1.
- b. Environmental Assessment Report. This report consist of all activities that comes under Activity 2 including site-specific Environmental Management Plan.

The total duration of this assignment is four months. The contractor is requested to complete all the activities within four months from commencement date. The contractor shall be responsible to incorporate all the comments made by MCA-Nepal, ENGINEER and MCC before the final design of the protection works.

Attachment#2
Power Quality & Energy Meter



Annex
B01-14-Power Qualit

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2 Codes & Standards	4
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5 Functionality of PQ Meters	6
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Energy Meter	18

List of Abbreviation

API	: Application Programming Interface
COMTRADE	: Power Quality Data Interchange Format
PQDIF	: Power Quality Data Interchange Format
ITIC	: Information Technology Industry Council
SEMIF47	: Semiconductor Equipment and Materials institute
CEA	: Central Electricity Authority
PQ	: Power Quality
SARFI	: System Average RMS-variation Frequency Index
SIARFI	: System Instantaneous Average RMS (Variation) Frequency Index
SMARFIX	: System Momentary Average RMS (Variation) Frequency Index
STARFIX	: System Temporary Average RMS (Variation) Frequency Index

1 Scope

This specification covers the design, manufacture testing, supply and delivery of A.C. static C.T operated, Panel Mounted Power quality meters with communication facility.

2 Codes & Standards

The equipment shall conform to this specification and latest revision of following codes with all amendments-

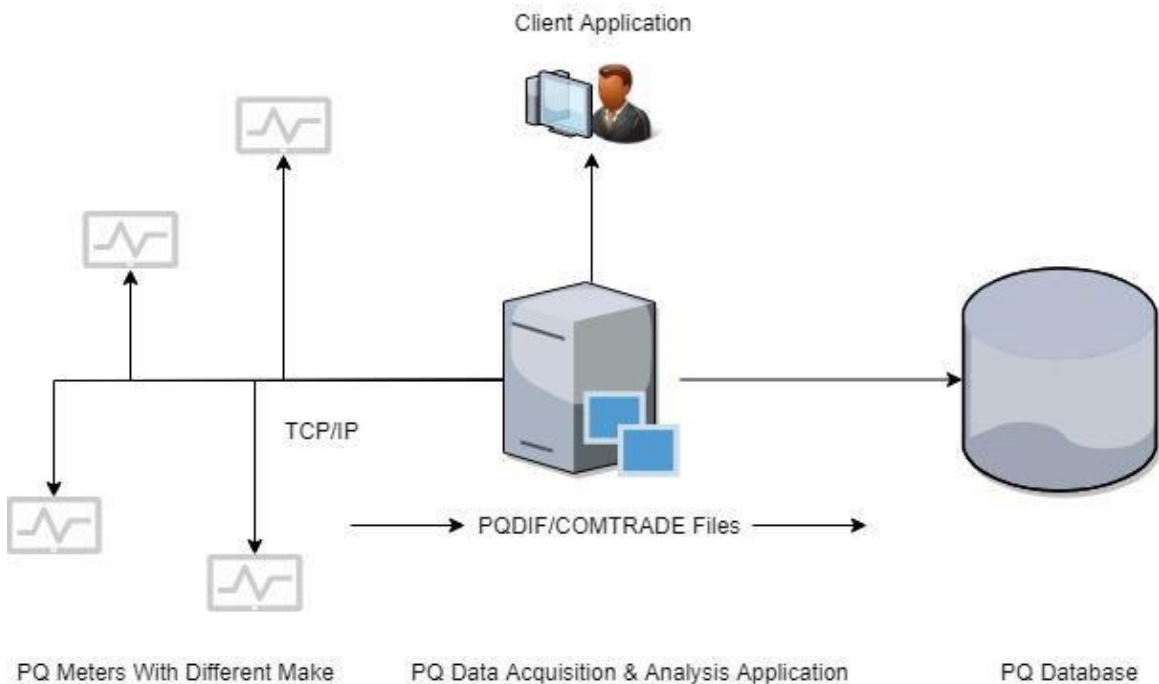
S No.	Standard Number	Title
2.1	IEC 61000-4-30	Class A: Measurements Power and Accuracy standard
2.2	IEC 61000-4-15	Flicker Measurement
2.3	IEC 61000-4-7	Harmonics Measurement
2.4	IEEE 519-2014	Recommended Practice and Requirements for Harmonic Control in Electric Power Systems
2.5	IEEE 1159.3	Power Quality Data Interchange Format.
2.6	C37.111	Common Format for Transient Data Exchange
2.7	EN 50160	Voltage Characteristics in Public Distribution Systems
2.10	EN-61000-2-12	Compatibility levels for low-frequency conducted disturbances and signaling in public medium-voltage power supply systems
2.12	IS 1 4697	AC static transformer operated Watt-Hour and VAR-Hour meters, class 0.2 S, 0.5 S and 1.0 S —
2.13	IEC 62586 - 1	Power Quality measurement in Power System – Functional test and uncertainty requirement (with Normative references).
2.14	IPC-A-600 IPC-A-610	Acceptability of printed Circuit Board Acceptability of Electronic Assemblies
2.15	IEC 60529	Degrees of protection provided by enclosures (IP Code)
2.16	IEC 61000-6-5	Immunity for power station and substation Environments
2.17	IEC 61010-1:2010	Safety requirements for electrical equipment for measurement, control, and laboratory use
2.18	IEC 60068	Environmental testing
2.19	IEC 60721	Classification of environmental conditions
2.20	IEC 61000-4-4 IEC 61000-4-5 IEC 61000-4-6 IEC 61000-4-3 IEC 61000-4-16 IEC 61000-4-11	Testing and measurement techniques – Immunity to Electrical fast transient/burst, Surge , conducted disturbances, induced by radio-frequency fields, Electrostatic discharge, Radiated, radio-frequency, electromagnetic field, conducted common mode disturbances in the frequency range 0 Hz to 150 kHz, Voltage dips, short interruptions and voltage variations
2.21	IEC61180	High Voltage test techniques for LV equipment
2.22	IEC 61000-2-2	Compatibility levels for low-frequency conducted disturbances and signaling in public low-voltage power supply systems.

S No.	Standard Number	Title
2.23	IEC 61000-6-1	Immunity for residential, commercial and light- industrial environments.

3 Service Condition

3.1	Power Supply	110 Volt DC or 230 Volt AC
3.2	Voltage Input	110/1.732 Vac or 433 VLLac-50 Hz—R-Y-B-N
3.3	Current Input	0-6 Amp RMS 3 Input (R, Y, B)
3.4	Environmental Condition	Instrument shall be suitable for environmental conditions as mentioned below
3.5	Temperature Range	Operation range: -10 Deg C to +55 Deg C Shall be Industrial grade components used.
3.6	Relative Humidity	Up to 95 %
3.7	Pollution	High Corrosive dust, smoke and rain
3.8	PQ Meter Input	From secondary of existing metering class Current and Voltage transformers installed in switchgears
3.9	Mounting arrangement	Din rail/ Rack/Panel mount in the existing panel
3.10	Dimensions Mounting & Housing	Compatible to installation at 11kV indoor switchboard.
3.11	Installation Voltage level	11kV and above

4 Power Quality Metering System Architecture:



- 4.1 Metering System with central monitoring of all the PQ metering devices is shown above in the architecture. Proposed monitoring system consists of one power quality analyzer software and multiple power quality meters from different make. All the power quality meters shall support for Recommended Practice for the Transfer of Power Quality Data (PQDIF)/ COMTRADE files via proposed communication technology under above architecture. (As per IEEE Std 1159.3-2003).
- 4.2 Power quality meters shall support multiple communications technologies for data transfer. Bidder shall provide the minimum requirements of communication parameters.
- 4.3 Power quality meters only act as raw data acquisition components and power quality analyzer performs all calculations and have advance analysis algorithm on acquired data from all the power quality meters. Central data repository of PQ data from all the power quality meters shall be stored and used for system improvement, Event analysis, management dashboard and as supporting data for premium customer complaint analysis.
- 4.4 Software upgrade shall be available as and when the release is announced irrespective of the buyer placing a request for the same.
- 4.5 Power Quality Meter's of all make and type should integrate with Enterprise software.
- 4.6 PQ system (including PQ meter & software) shall support Indian power quality standards as and when available.
- 4.7 All PQ meters will integrate with enterprise software on common communication protocol.
- 4.8 PQ analysis reports, event records, notification and management dashboards should be web-based.

5 Functionality of PQ Meters

S.N.	Parameter	Description
5.1	Power Supply	3P-4W and 3P-3W Supply. Should work with or without neutral or with any two wires. AC Range: 85- 265 Vac/ (50Hz with + / - 5% variation) DC Range: 24-375 VDC
5.2	Voltage Input	4 Input: 3P-4W with Max Surge Protection of 6kV -0-460 Vac- R-Y-B-N--50Hz
5.3	Current Input	0-6 Amp RMS 3 Input (R, Y, B)
5.4	Retention of Data and RTC	Required for Data and RTC.
5.5	Display	General LED indicators for Power ON, Data Communication, Status
5.6	Measurement Parameters	All data measured should have minimum, maximum and average value. Refer Annexure A,B and C
5.7	Events	Following are indicative events list: <ul style="list-style-type: none"> • Voltage dips, swell and Short/Long interruption

S.N.	Parameter	Description
		<p>with waveform record</p> <ul style="list-style-type: none"> • Voltage transients with waveform • Current Transients • Selectable pre-trig $20\text{ms} < T < 5\text{s}$ for All Event capture (Voltage and current waveform) • Selectable post-trig $1\text{s} < T < 10\text{s}$ for All Event capture (Voltage and current waveform) • Discrimination between upstream and downstream events.
5.8	Communication Standard for Data Exchange	<ul style="list-style-type: none"> • Support TCP/IP for data exchange • Support IEC 61850 protocol for data exchange as and when available (Optional)
5.9	Communications Interface	<ul style="list-style-type: none"> • Built-in Ethernet interface RJ45 (10/100 Mbit), DHCP enabled. • Full UART RS232/RS485 Configurable with DB9 connector – Interfacing Communication device • USB Port – Configuration locally
5.10	Programmability of PQM	<p>Should Support</p> <ul style="list-style-type: none"> • Remote configuration of parameters – Web/ Window application based configuration • Locally/ Remote Firmware Upgrade
5.11	Memory	<ul style="list-style-type: none"> • Local Memory capacity to store the data of all parameters for duration of one month. (On Maximum Data Collection frequency). • Circular Memory-FIFO (for long Term data). • Non-volatile memory independent of battery backup, Data should be retained up to 10 years.
5.12	Calibration	<ul style="list-style-type: none"> • Meters shall be calibrated at accredited Labs, Required hardware and software support to be provided by vendor.
5.13	Digital Input /output	<ul style="list-style-type: none"> • Input and Output 200 V DC, max 200mA – 2 No.
5.14	Time synchronization	Auto Time Synchronization (NTP)
5.15	Electrical isolation	Isolated from all internally potentials
5.16	Event direction discrimination	Discrimination of Upstream/downstream event (sag, harmonics)
5.17	Sampling Frequency	should be above: 10kHz

S.N.	Parameter	Description
5.18	Data collection interval and parameter list	Configurable
5.19	Body of Meter	Front cover & base should be with IP65 grade enclosure.
5.20	Warrantee	5 Years.
5.21	Insulation	Instrument shall withstand an insulation test of 6 kV and impulse test at 6 kV
5.22	ADC Resolution	Min 12 bit
5.23	Bandwidth for time series data	3 kHz minimum

6 General requirements

- 6.1 Meter Sr. Nos. to be printed in on the name plate, with date and year of manufacturing.
- 6.2 Meter shall be enabled with communication inside hence hardware ID shall be compulsory mentioned in the front.
- 6.3 Meters shall be suitably packed with environmental friendly material in order to avoid damage or disturbance during transit or handling and to prevent ingress of moisture and dust.
- 6.4 Meters shall be supplied along with configuration cable/Ethernet cable suitable to read/configure meters at one unit per meters.
- 6.5 PQ meter should use standard sign convention for import (+)/export (-) of energy/power and lag (+)/lead (-) Power factor and Reactive Power.
- 6.6 Product and Software Training, Verification and technical support, calibration support shall be available in India.
- 6.7 At least two Power Quality training workshops should be conducted by OEM for AEML users.
- 6.8 Successful bidder should deploy only single piece of product to integrate with enterprise software. Subsequently, on successful integration and after two month of performance check period, remaining quantity should be supplied and deployed.
- 6.9 PQ meters should provide data in PQDIFF/COMTRADE format to central remote server with enterprise software either directly or using data collection software.
- 6.10 There will be single data repository for storing PQDIFF/ COMTRADE data for PQ meters of all make.
- 6.11 The data for Time Series and Event should be communicated to enterprise software on regular preselected intervals.
- 6.12 PQ Meter should have remote setting facility for threshold levels of parameters necessary to generate event (Annexure A, B and C).

- 6.13 PQ meters should be able to measure phase to ground voltage and based on it threshold settings events are triggered.
- 6.14 The PQ meter Bidder should understand / consider specification of enterprise software also.
- 6.15 PQ Meter should have support (including hardware, software etc) for the period of 10 years.
- 6.16 Considering the sampling frequency, anti-aliasing filter (specification) incorporated should be specified in detail by the successful Bidder(s).
- 6.17 Successful Bidders should provide updates for next 5 years, necessary to remain integrated with upstream enterprise software.

7 System Requirements

- 7.1 Enterprise software will also integrate with GIS for identification of fault distance based on voltage sag observed at point of installation. In view of it, PQ meter should have digital inputs from relay trip contact of breaker tripped for identification of tripped feeder.
- 7.2 PQ meter shall be robust and based on following basic attributes: scalability, availability, reliability, safety, confidentiality, integrity and maintainability.
- 7.3 PQ meter data shall be accessible from application through business processes and managed APIs.
- 7.4 PQ Meter shall provide end-to-end data protections to ensure no data is lost or corrupted during processing, storage, and transportation between meter and interfaces.
- 7.5 PQ Meter/System should be able to discriminate events viz. sags, swell, harmonics occurred due to upstream and Downstream separately.
- 7.6 PQ Meter/ System should have capability for Automatic generation of E-mail and SMS to stakeholders for user configured events viz. Sags, Swell, RVC, and Harmonic etc (as per EN60150 limits).
- 7.7 A single consolidated PQ reports generated by Enterprise Software for all the meters, shouldn't include the "common events/sags" registered by all meters. This happens specifically in case of upstream events which are seen by all downstream meters. This is to avoid/eliminate investigation/ updating duplicity.
- 7.8 Enterprise Software will automatically notify Monthly/Weekly meter wise and universal event analysis report and Power Quality report as per EN50160 standard.
- 7.9 PQ product should comply data requirement for Enterprise Software to generate statistical reports viz. ITC, SEMIF47, SARFI indices, SAG classification Table/ Chart, SAG Timeline Chart/ Table , three dimension histogram (for no of sag, duration and % of depth) and TDD table as per IEEE519 standard for user selected duration. Moreover, generated reports by Enterprise software viz. EN50160 and user configured will be device specific and also collated for all devices.

- 7.10 PQ product should comply data required for classification of downstream and upstream sag/swell/interruption/harmonic events. Moreover, reason transients should be interpreted. Thereafter, all the events will be shown in tabular form with nature of events viz. sag/swell/interruption (short, long), transients with direction, time stamp and duration with depth characteristics. Also in enterprise software there will be comment field against event to specify its reason by user.
- 7.11 The instantaneous waveform captured by PQ Meter for triggered parameters should be made available in PQDIFF format to enterprise software for graphical representation.
- 7.12 PQ Meter's should record parameters needed by enterprise software for report generation and event notification.

8 Testing Requirement

- 8.1 The testing specified in IEC 61000-4-30 clause 6.2 or IS 14697-C112 (whichever supersedes) should be followed and subsequent reports should be submitted.
- 8.2 Testing and calibration of all PQ meters shall be carried out every 5 years. Moreover, as and when required by the buyer.
- 8.3 To achieve the accuracy stated as stated in IEC61000-4-30 and IEC61000-4-7 some simple adjustment of the instrument, according to clear indications to be given by the manufacturer, by means of an internal or external calibrator may be required. The uncertainty of the calibrator (if internal) shall be specified.
- 8.4 The IP65 enclosure protection test certificate should be submitted by successful bidder.
- 8.5 Successful Bidder(s) should provide compliance certificate (IEC61000-4-30 latest edition) for meters supplied. Moreover, it should submit routine accuracy/calibration test certificate for all the supplied meters as per IEC 62856 standard.
- 8.6 Successful Bidder(s) should submit list of components (Bill of Material) with manufacturer's details and corresponding material invoice copy and routine test certificates. The processors and component used in the meter should be of reputed brand. The performance test certificate of CT and PT used inside the product should be submitted.
- 8.7 Printed Circuit Board used in the meter should be tested as per standard (IPC-A- 600) and submitted by successful Bidder.

9 Safety & Security requirements

- 9.1 Meter Data stored in the devices shall be encrypted and compressed format.
- 9.2 Encrypted data shall be obtained by compliance Software provided by the vendors.
- 9.3 Meter shall not be affected by any external control device & shall continue recording data under any influence external conditions.
- 9.4 However, a potential free watch dog contact shall be provided to use as alarm hook up with SCADA/remote server in case of PQM failure.
- 9.5 The cover of PQ meter shall not be removable without the use of a tool. The Case shall be so constructed and arranged that any non-permanent deformation cannot prevent the satisfactory operation of meter.

- 9.6 The meters having a case wholly or partially made of metal, shall be provided with a protective earth terminal.
- 9.7 Terminals with different potentials which are grouped close together shall be protected against accidental short circuiting. Protection may be obtained by insulating barriers. Terminals of one current circuit are considered to be at the same potential.
- 9.8 Every meter shall be indelibly marked with a diagram of connections.
- 9.9 The instrument manufacturer shall specify the fuse size; this will be low enough to protect the test lead against overload conditions. Furthermore, the interrupting capacity of the fuse will be consistent with the available power-frequency fault current at the point of connection.
- 9.10 If screw terminals are used in the measurement instrument, appropriate covers will be used to insulate the terminations.
- 9.11 Care should be taken that the secondaries of current transformers, if used, do not become open circuit, i.e. there shall be no fuse in the secondaries of such circuits, and the connection to the burden shall be mechanically secure.
- 9.12 If PQ meter should provide inbuilt protection to withstand input high current. Furthermore, instruments should not lose its declared accuracy/ linearity during normal current flow with precedence of huge short circuit current (IEC61000-4-7 clause 5).

Note:

- A. Annexure A, B, C and D are to submitted (duly filled /signed) by Manufacturer with Product Code
- B. Necessary Test Certificates/reports complying standards should be submitted.
- C. Brief explanation for Deviation or any other should be attached with reference clause Number.

1. Annexure A

Time Series Data recording (every 200msec for 50Hz system)

Sr. No	Time Series parameter	Feature Availability Yes /No-(Model Number)				
		Average / Max/Min	R-Phase	Y-Phase	B-Phase	SUM- Σ
A.1	Voltage Frequency					
A.2	RMS Voltage Value--L-L and L-Ph					
A.3	RMS Current Value					
A.4	Voltage Peak (+/-)					
A.5	Current Peak (+/-)					
A.6	Active Power					
A.7	Reactive Power					

Sr. No	Time Series parameter	Feature Availability Yes /No-(Model Number)				
		Average / Max/Min	R-Phase	Y-Phase	B-Phase	SUM- Σ
A.8	Apparent Power					
A.9	True and displacement PF					
A.1	Voltage Unbalance Factor					
A.11	Current Unbalance Factor					
A.12	Harmonic Voltage--up to 50th					
A.13	Current Harmonic-up to 50th					
A.14	Harmonic Power --up to 50th					
A.15	Harmonic Voltage -current Phase and also its difference					
A.16	Inter-Harmonic Voltage--0.5 to 49.5th					
A.17	Inter Harmonic Current--0.5 to 49.5th					
A.18	THD Voltage					
A.19	THD and TDD Current					
A.20	THD –Inter harmonic current					
A.21	K-Factor					
A.22	Rapid Voltage Change					
A.23	All Energy Measurement					
A.24	TDD current based on user set Peak load current					
A.25	Positive, Negative and zero sequence for voltage					
A.26	Positive, Negative and zero sequence for current					

2. Annexure B

Time Series data but not at every 200msec

S. N.	Time Series parameter	Feature Availability Yes /No			
		Average / Max/Min	R-Phase	Y-Phase	B-Phase
B.1	Short Interval IEC Voltage Flicker measurement---Pst – 10 minute interval				
B.2	Long Interval IEC Voltage Flicker measurement – Plt – 2hour interval.				
B.3	Each Phase V10 flicker --1 minute				
B.4	Instantaneous Flicker as per IEC61000-4-15				

3. Annexure C

Triggered Events (that has to be triggered) with Threshold setting

S.N.	Triggerable parameter	Threshold	Channel	Feature Availability Yes /No
C.1	Voltage Frequency	+ - 0 to 30Hz to nominal	Only One Channel	
C.2	RMS Voltage Value	± % Nominal	R-Y and B Phase	
C.3	RMS Current Value	± % Nominal	R-Y and B Phase	
C.4	Voltage Peak (+/-)	% Nominal	R-Y and B Phase	
C.5	Current Peak (+/-)	% Nominal	R-Y and B Phase	
C.6	Active Power	% Nominal	R-Y, B and sum	
C.7	Reactive Power	% Nominal	R-Y, B and sum	
C.8	Apparent Power	% Nominal	R-Y, B and sum	
C.9	True/displacement PF	%	R-Y, B and sum	
C.10	Voltage Unbalance Factor	Higher than %	Sum (Σ)	
C.11	Current Unbalance Factor	Higher Than %	Sum (Σ)	
C.12	Harmonic Voltage--1st To 50th	% Nominal of 50Hz Value	R-Y and B Phase	
C.13	Current Harmonic-1st To 50th	% Nominal of 50Hz Value	R-Y and B	

			Phase	
C.14	Harmonic Power --1st To 50th	% Nominal of 50Hz Value	R-Y, B and sum	
C.15	Harmonic Voltage -current and Phase difference	Absolute Value	R-Y and B Phase	
C.16	Inter-Harmonic Voltage-- 0.5 to 49.5th	% Nominal of 50Hz Value	R-Y and B Phase	
C.17	Inter Harmonic Current	% Nominal of 50Hz Value	R-Y and B Phase	
C.18	THD Voltage	% Absolute value	R-Y and B Phase	
C.19	THD Current	% Absolute value	R-Y and B Phase	
C.20	THD -Inter harmonic current	% Absolute value	R-Y and B Phase	
C.21	K-Factor	Higher than Absolute Value	R-Y and B Phase	
C.22	Transient Voltage	% of nominal RMS Volt	R-Y and B Phase	
C.23	Voltage Swell	% of nominal RMS Volt	R-Y and B Phase	
C.24	Voltage Dip	% of nominal RMS Volt	R-Y and B Phase	
C.25	Voltage Instantaneous ,Long ,Short Interruption	% of nominal RMS Volt	R-Y and B Phase	
C.26	For Every Events Triggered min 10 cycle of Voltage and current (before and after event subdues) has to be captured		R-Y and B Phase	

4. Annexure D
PQ Meter Details

S.N.	Parameter	Description	Comply Yes /No
D.1	Power Supply	<ol style="list-style-type: none"> 3P-4W and 3P-3W Supply. Should work with or without neutral or with any two wires. AC Range: 85- 265 Vac/ (50Hz with + / - 5% variation) DC Range: 24-375 VDC 	<ol style="list-style-type: none">
D.2	Voltage Input	4 Input: 3P-4W with Max Surge Protection of 6kV-0-460 Vac- R-Y-B-N--50Hz	
D.3	Current Input	0-6 Amp RMS 3 Input (R, Y, B)	
D.4	Retention of Data and RTC	Required for Data and RTC.	
D.5	Accuracy	Class A as per IEC61000-4-30 latest edition & IEEE 519-2014 (Gapless measurement)	
D.6	Display	General LED indicators for Power ON, Data Communication, Status	
D.7	Communication Standard for Data Exchange	<ol style="list-style-type: none"> Support TCP/IP for data exchange Support IEC 61850 protocol for data exchange as and when available. 	<ol style="list-style-type: none">
D.8	Operating Conditions / Climatic Conditions	<ol style="list-style-type: none"> Operational temperature -10°C to +55°C Humidity: up to 95% non-condensing , 	<ol style="list-style-type: none">
D.9	Communications Interface	<ol style="list-style-type: none"> Built-in Ethernet interface RJ45 (10/100 Mbit) , DHCP enabled. Full UART RS232/RS485 Configurable with DB9 connector – Interfacing Communication device USB Port – Configuration locally 	<ol style="list-style-type: none">
D.11	Programmability of PQM	<p>Should Support</p> <ol style="list-style-type: none"> Remote configuration of parameters – Web /Window application based configuration Locally/ Remote Firmware Upgrade 	<ol style="list-style-type: none">
D.12	Dimensions Mounting & Housing	Compatible to installation at 11kV indoor switchboard.	
D.13	Memory	1. Local Memory capacity to store the data of all parameters	1.

S.N.	Parameter	Description	Comply Yes /No
		for duration of one month. (On Maximum Data Collection frequency) 2. Non-volatile memory independent of battery backup, Data should be retained up to 10 years.	2.
D.14	Calibration	Meters shall be calibrated at accredited Labs, Required hardware and software support to be provided by vendor.	
D.15	Digital Input/output	Input and Output 200 V DC, max 200mA – 2 No.	
D.16	Time synchronization	Auto Time Synchronization (NTP)	
D.17	Electrical isolation	Isolated from all internally potentials	
D.18	Event direction discrimination	Discrimination of Upstream/downstream event (sag, harmonics)	
D.19	Sampling Frequency	1. For Time Series Data i.e. 200 msec (Specify). 2. For Disturbance Records (Specify).	
D.20	Data collection interval and parameters	Configurable	
D.21	Mounting arrangement	Din rail/ Rack/Panel mount in the existing panel(Specify)	
D.22	Body of Meter	Front cover & base should be with IP65 grade enclosure.	
D.23	Warrantee	5 Years.	
D.24	Insulation	Instrument shall withstand an insulation test of 6 kV and impulse test at 6 kV	
D.25	ADC Resolution	Min 12 bit	
D.26	Bandwidth for time series data	Above 3 kHz ---specify the bandwidth	
D.27	PQ Meter Input	From secondary of existing metering class Current and Voltage transformers installed in switchgears	
D.28	PQ Diff (.pqd)	Data Format—IEEE1159.3 communicated to Central repository (also specify which data is in this format)	
D.29	COMTRADE	Data Format (also specify which data is in this format)	
D.30.	Integration	Bidder should integrate with Enterprise Software	
D.31	Software/Product	Bidder should give support for product software, hardware	

S.N.	Parameter	Description	Comply Yes /No
	Firm ware support	and firmware for next 10 years	
D.32	Test Certificate	Test certificate and test results (as per compliance to Section 2)	
D.33	Dimensions	Provide Lx B x D (mm)	
D.34	Section 6		
D.35	Section 7	Specify clause Number here for deviation in sub sections with detail explanation in separate document.	
D.36	Section 8		
D.37	Section 9		
D.38	Dip ,Sag and Swell	The Urms (1/2 cycle) methodology adopted.	
D.39	Allowable DC component	Specify maximum allowable DC component so that additional influence error does not exceed the stated accuracy.	
D.40	Rated operating condition and magnitude of error	Specify magnitude of error introduced by changes in <ol style="list-style-type: none"> 1. Temperature 2. Humidity 3. Common Mode Interference voltage between earth connection of instrument 4. Static electric discharge 5. Radiated electromagnetic field. 	<ol style="list-style-type: none"> 1. 2. 3. 4. 5.

Energy Meter

Specification for Revenue Meter & Metering (Instrument) Transformer

General

The units shall be suitable for operating in Outdoor environment and shall be manufactured by International Reputed ISO 9001 Company

Energy Meter

The Energy Meter shall have the following minimum requirement

Type	Electronic, 3Phase, 4wire, Wye Connection, Bi-directional
Accuracy Class	0.2
Applicable Standard	IEC 687 (latest edition) or Equivalent
Measurement	a) Polyphase Quantities kWh, kVARh, kVAh b) Instantaneous Quantities Real Time, kW, kVA, PF, Volts, Amps, Frequency
Rated Current (In)	5A or 1A
Rated Maximum Current	1.2*In
Starting Current	0.001*In
Voltage (Phase)	110V/ $\sqrt{3}$
Frequency	50Hz
Programmable Interval length	At least 1 to 30 min
Load Profile Memory Storage	At Least 60 days of storage using 4 channels at 15min Intervals
Channels of Load Profile Data	At Least 4 channels of storage (kWh import, kWh export, kVARh Import, kVARh export)
Other Features to be Included	a) Serial communication port and Accessories b) Optical Port Communication (With optical Probe) c) Remote Download Modem (in built) d) Hardware Key to Prevent any Calibration and configuration change e) PT or CT error gain correction f) Non Volatile memory g) Inbuilt Super capacitor h) Meter shall be able to record and store in Non-Volatile memory the instant of Power failure and the instant of supply restoration.

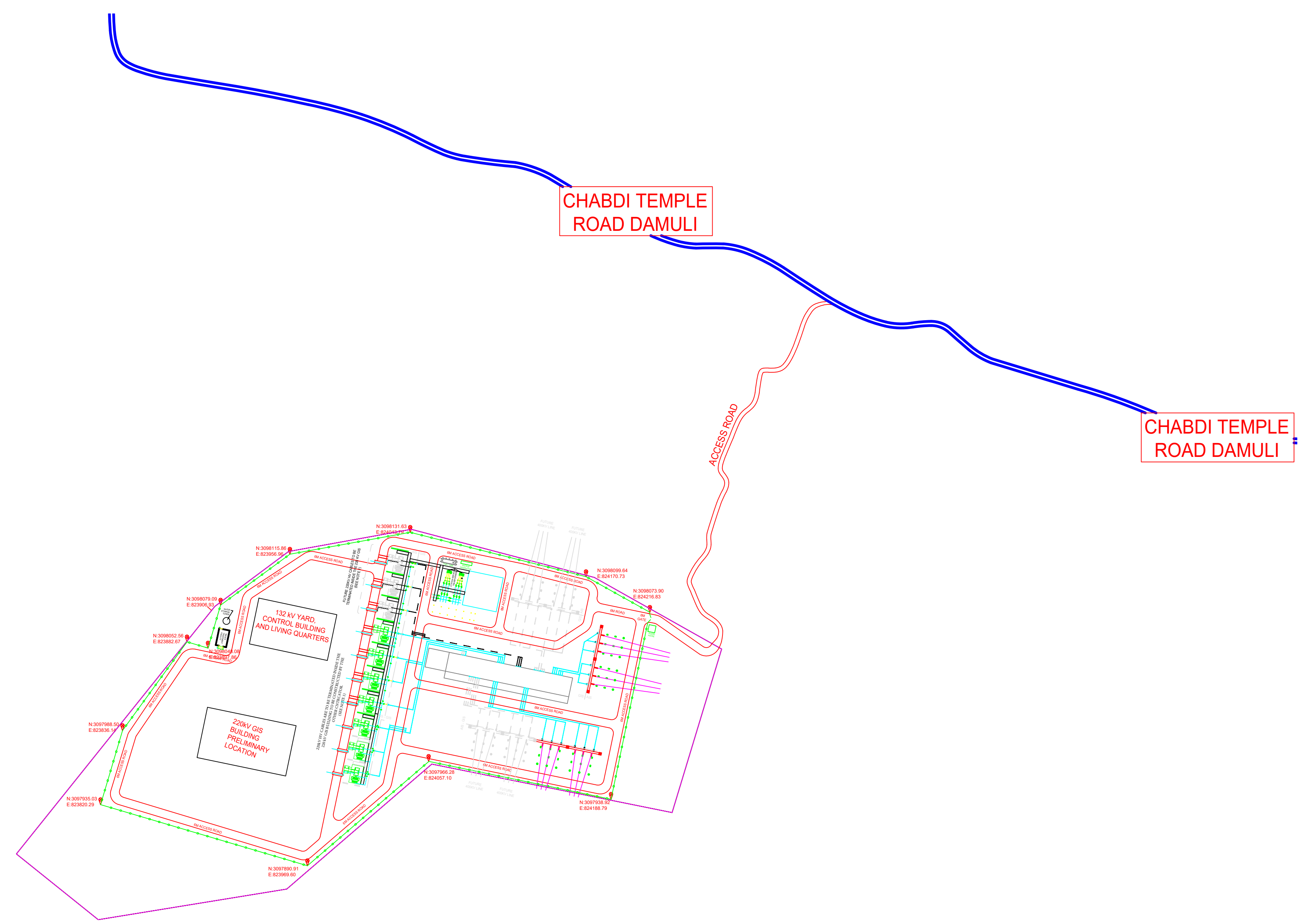
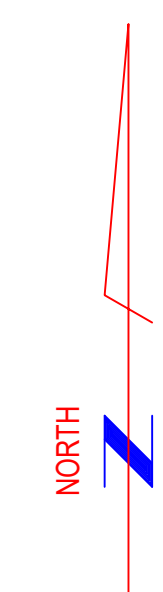
Attachment#3
Drawings



NDM-210-1-Rev
6.pdf



NDM-200-1-Rev
8.pdf_08.05.2023.pdf



- NOTES**
- COORDINATE SYSTEM USED IN THIS DRAWING IS THE FOLLOWING:
 WGS 84 / UTM ZONE 44N
 WORLD - N HEMISPHERE - 78°E TO 84°E - BY COUNTRY, BETWEEN 78°E AND 84°E, NORTHERN HEMISPHERE BETWEEN EQUATOR AND 84°N, ONSHORE AND OFFSHORE. CHINA, INDIA, KAZAKHSTAN, KYRGYZSTAN, NEPAL, RUSSIAN FEDERATION, SRI LANKA, WORLD GEODETIC SYSTEM 1984
 - ALL COORDINATE POINTS ARE ESTIMATES AND SHOULD BE VERIFIED BEFORE FINAL DESIGN,

THIS DRAWING WAS PREPARED BY POWER ENGINEERS, INC. FOR A SPECIFIC PROJECT. TAKING INTO CONSIDERATION THE SPECIFIC AND UNIQUE REQUIREMENTS OF THE PROJECT. REUSE OF THIS DRAWING OR ANY INFORMATION CONTAINED IN THIS DRAWING FOR ANY PURPOSE IS PROHIBITED UNLESS WRITTEN PERMISSION FROM BOTH POWER AND POWER'S CLIENT IS GRANTED.

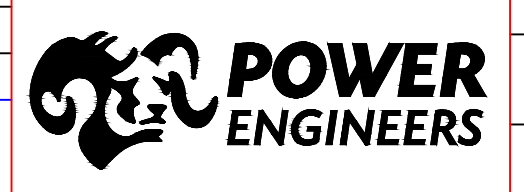
NOT FOR CONSTRUCTION
2-12-2020

REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD	REFERENCE DRAWINGS
5	REVISED PER MCA COMMENTS	10-10-19	JLT	JLT	VAD		
4	REVISED PER INTERNAL CHECK	7-22-19	JLT	JLT	VAD	*	
3	REVISED PER RECEIVED COMMENTS	7-3-19	JLT	JLT	VAD	*	
2	REVISED FOR WSP COMMENTS	4-12-19	JLT	JLT	VAD	***	
7	REVISED FOR FUTURE AUTO 3 CHANGE	2-12-20	JLT	JLT	VAD	***	*

DSGN	JLT	11-30-2018
DRN	JLT	11-30-2018
CKD	VAD	11-30-2018

SCALE: 1:50

FOR 22/34 DWG ONLY

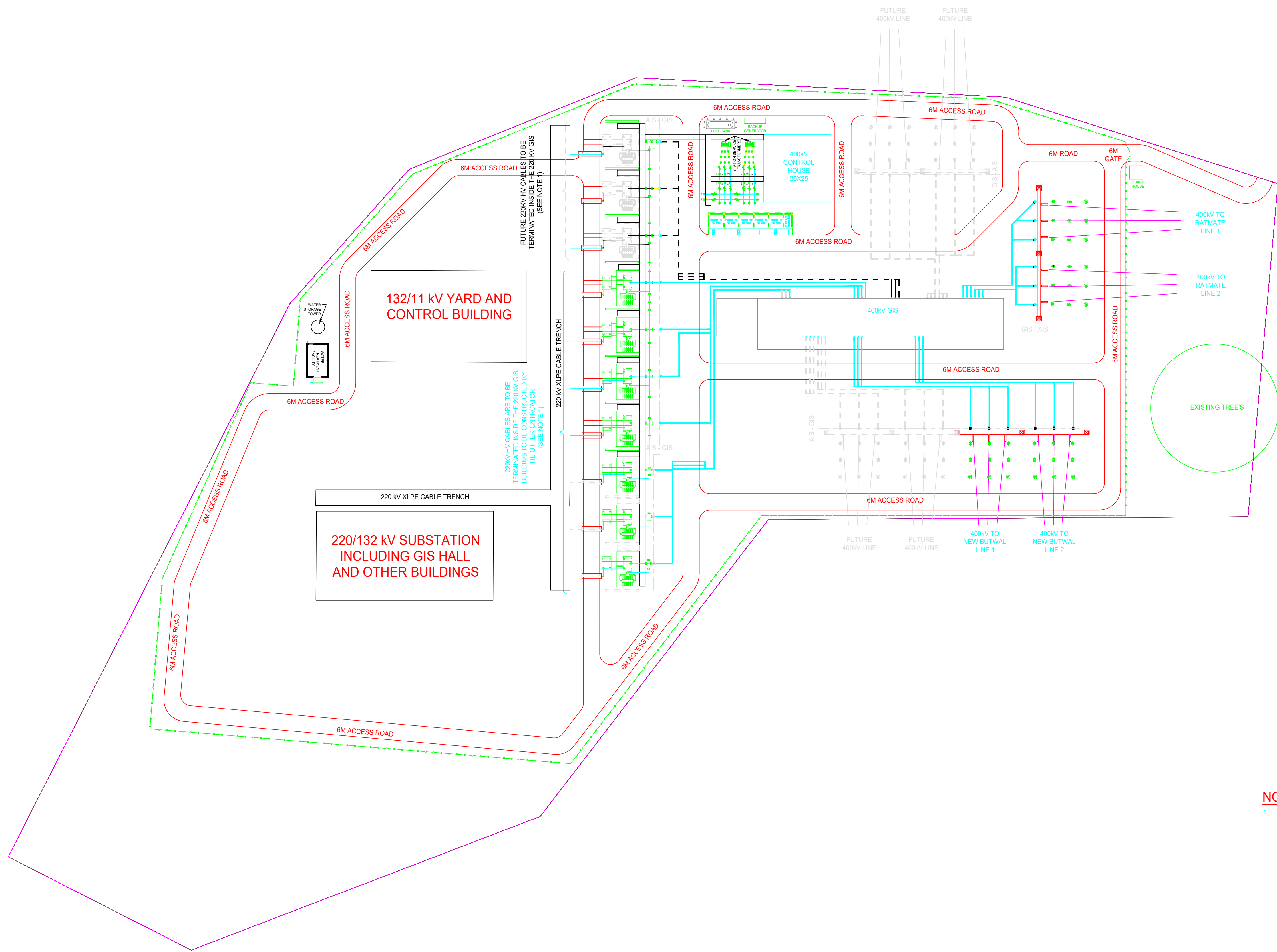


STANTEC CONSULTING SERVICES, INC.

AERIAL SITE PLAN

NEW DAMAULI 400/220/132KV SUBSTATION

JOB NUMBER	REV
153312	6
DRAWING NUMBER	
NDM-210-1	



NOTE:

- CONTRACTOR IS TO PROVIDE, TERMINATE, INSTALL, AND COMMISSION THE 220kV CABLES LAID THROUGH CABLE TRENCHES TO BE PROVIDED BY THE CONTRACTOR HIMSELF. THE CABLES SHALL BE TERMINATED WITH CABLE POT HEAD ON THE 220 kV SIDE OF THE AUTO TRANSFORMER WITH OTHER NECESSARY ARRANGEMENTS. SUITABLE TERMINATION OF THE OTHER END OF THE CABLE AT THE INDOOR 220 kV GIS BUILDING SHALL BE THE RESPONSIBILITY OF THE OTHER CONTRACTORS.

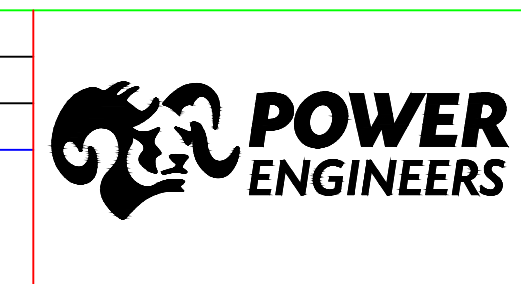
NDM-200-1.DWG

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NOT FOR CONSTRUCTION
2-12-20

5	REVISED PER INTERNAL CHECK	7-23-19	JLT	JLT	VAD	*			
4	REVISED PER RECEIVED COMMENTS	7-3-19	JLT	JLT	VAD	*			
8	REVISED FOR FUTURE AUTO 3 CHANGE	2-12-20	JLT	JLT	VAD	*			
7	REVISED PER MCA COMMENTS	10-10-19	JLT	JLT	VAD	***	120-1	CONTROL BUILDING LAYOUT	
6	GIS SWITHING OF SPARE AUTO	8-12-19	JLT	JLT	VAD	*	300-1	400kV GIS GENERAL ARRANGEMENT	
REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD		REFERENCE DRAWINGS	

DSGN	JLT	11-30-18
DRN	JLT	11-30-18
CKD	VAD	11-30-18
SCALE:	1mm = 20M	
FOR 22x34 DWG ONLY		



STANTEC CONSULTING SERVICES, INC.
GENERAL ARRANGEMENT
NEW DAMALI 400/220/132kV SUBSTATION

JOB NUMBER	155312
DRAWING NUMBER	NDM-200-1

REV 8