KENYA PIPELINE COMPANY
KENPIPE PLAZA, SEKONDI ROAD
OFF NANYUKI ROAD, INDUSTRIAL AREA
P. O. BOX 73422 – 00200
NAIROBI
Website: www.kpc.co.ke

INVITATION TO TENDER NO. KPC/PU/OT-038/I&C/NBI/21-22

TENDER FOR DESIGN, SUPPLY, INSTALLATION, CONFIGURATION, TESTING AND COMMISSIONING OF SCADA SYSTEM UPGRADE

October 2021

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INVITATION TO TENDER

PROCURING ENTITY: KENYA PIPELINE COMPANY LIMITED

TENDER FOR DESIGN, SUPPLY, INSTALLATION, CONFIGURATION, TESTING AND COMMISSIONING OF SCADA SYSTEM UPGRADE

1. The Kenya Pipeline Company Limited invites sealed tenders for Design, Supply, Installation, Configuration, Testing and Commissioning of Scada System Upgrade

2. Tendering will be conducted under open procurement method using a standardized tender document. Tendering is open procurement to qualified Tenderers.

3. Qualified and interested tenderers may obtain further information on the Tender Documents from the website: www.kpc.co.ke.

   Tender documents may be obtained electronically from the Website(s) www.kpc.co.ke or www.tenders.go.ke. Tender documents obtained electronically will be free of charge.

4. Tender documents may be viewed and downloaded for free from the website: www.kpc.co.ke.

5. Tenders shall be quoted be in US Dollars and shall include all taxes. Tenders shall remain valid for One Hundred and Eighty-Two days 182 days from the date of opening of tenders.

6. All Tenders must be accompanied by a Tender Security of USD.20,000.00 Bidders must submit a scanned copy of the Tender Security together with their bid document. The Original Tender Security must be dropped in the Tender Box on the Ground, Floor, Kenpipe Plaza, Sekondi Road off Nanyuki Road, Industrial Area on or before the **3rd November 2021**. Only the Tender Security should be dropped in the Tender Box. KPC shall not accept any bids or parts of bids submitted in the Tender Box.

7. Completed tender documents must be submitted electronically in PDF format and uploaded on the Supplier Relationship Management (SRM)

Collaboration Folder on or before **10.00am, 3rd November 2021**. Documents attached in attachment section will not be considered for evaluation. Hard copies of tender documents will not be permitted. Late submission will automatically be locked out by the system

A guide on how to upload tender documents is available at KPC website.

8. Tenders will be opened immediately after the deadline date and time specified above or any deadline date and times specified later. Tenders will be publicly opened in the presence of the Tenderers' designated representatives who choose to attend.

9. **Late tenders will not be accepted**

10. The addresses referred to above are:

A. **Address for obtaining further information**

General Manager (Supply Chain)
Kenya Pipeline Company Limited
P. O BOX 73422 – 00200
NAIROBI
E-mail address opentender@kpc.co.ke
Tel: 020 260 6500 – 4,
0720207678/79/81
0709723004/6

Bidders who are not registered in KPC SRM system should first register using this link https://e-procurement.kpc.co.ke/irj/portal (Instruction manual for Supplier Registration and the bidding process are available on KPC website on www.kpc.co.ke.

B. Address for Submission of Tenders.

Kenya Pipeline Company Limited

Completed tender documents must be submitted electronically in PDF format and uploaded on the Supplier Relationship Management (SRM) Collaboration Folder Using the link https://e-procurement.kpc.co.ke/irj/portal

Hard copies of bid documents will not be accepted.

C. Address for Opening of Tenders.

The Tender opening shall take place virtually using the link: https://forms.office.com/r/Z8BFkEjM66

Name: _____

Designation: GENERAL MANAGER SUPPLY CHAIN

Signature: _____

Date _____

PART 1 - TENDERING PROCEDURES

SECTION I: INSTRUCTIONS TO TENDERERS

A. GENERAL

1. Scope of Tender

1.1 The Procuring Entity, as indicated **in the Tender Data Sheet (TDS)**, issues this tendering document for the Design, Supply, Installation, Configuration, Testing and Commissioning of Scada System Upgrade as specified in Section V, Procuring Entity's Requirements. The name, identification and number of lots (contracts) of this **Instructions to Tenderers (ITT)** are specified **in the TDS.**

2. Definitions

2.1 Unless otherwise stated, throughout this tendering document definitions and interpretations shall be as prescribed in the Section VI, General Conditions of Contract.

2.2 Throughout this tendering document:

a) The term "in writing" means communicated in written form (e.g., by mail, e-mail, fax, including if specified in the **TDS**, distributed or received through the electronic-procurement system used by the Procuring Entity) with proof of receipt

b) If the context so requires, "singular" means "plural" and vice versa; and

c) "Day" means calendar day, unless otherwise specified as "Business Day". A Business Day is any day that is an official working day of the Procuring Entity. It excludes the Procuring Entity's official public holidays.

d) "The Contract" means the agreement entered into between KENYA PIPELINE COMPANY and the contractor, as recorded in the Contract Form signed by the parties, including all attachments and appendices thereto and all documents incorporated by reference therein.

e) "The Contract Price" means the price payable to the contractor

under the Contract for the full and proper performance of its contractual obligations

f) "The Goods" means all the equipment, machinery, and/or other materials, which the contractor is required to supply to KENYA PIPELINE COMPANY under the Contract.

g) "Information System" shall carry the same meaning as "Information Technology". Interchangeably may mean SCADA System Upgrade

h) "KENYA PIPELINE COMPANY" means the organization purchasing the Goods under this Contract, otherwise known as "The Employer or Procuring Entity".

i) "The Contractor" means the individual or firm supplying the Goods under this Contract.

j) "Supplier" means the Contractor and/or his sub-contractor and/or their employees

k) "GCC" means the General Conditions of the Contract

l) "SCC" means the Special Conditions of the Contract

m) "SCADA" means Supervisory Control and Data Acquisition

n) "PAS" mean Pipeline Application system

o) "RTU" means Remote Terminal Unit

p) "LDS" means Leak Detection System

q) "PLC" means Programmable Logic Control

r) "APPS" means Application Software

s) "MMI" means Man Machine Interface

t) "CPU" means Central Processing Unit

u) "PMS" means Pipeline Management System

v) "ESD" means Emergency Shutdown

w) "TAS" means Terminal Automation System

x) "TIS" means Tank Inventory System

y) "FAT" means Factory Acceptance test

z) "Trial Run" means a 72-hour continuous run of the specific section of works under test.

3. Fraud and Corruption

3.1 The Procuring Entity requires compliance with the provisions of the Public Procurement and Asset Disposal Act, 2015, Section 62 "Declaration not to engage in corruption". The tender submitted by a person shall include a declaration that the person shall not engage in any corrupt or fraudulent practice and a declaration that the person or his or her sub-contractors are not debarred from participating in public procurement proceedings.

3.2 The Procuring Entity requires compliance with the provisions of the Competition Act 2010, regarding collusive practices in contracting. Any tenderer found to have engaged in collusive conduct shall be disqualified and criminal and/ or civil sanctions may be imposed. To this effect, Tenderers shall be required to complete and sign the "Certificate of Independent Tender Determination" annexed to the Form of Tender.

3.3 Unfair Competitive Advantage -Fairness and transparency in the tender process require that the Firms or their Affiliates competing for a specific assignment do not derive a competitive advantage from having provided consulting services related to this tender. The Procuring Entity shall indicate in the TDS firms (if any) that provided consulting services for the contract being tendered for. The Procuring Entity shall check whether the owners or controllers of the Tenderer are same as those that provided consulting services. The Procuring Entity shall, upon request, make available to any tenderer information that would give such firm unfair competitive advantage over competing firms.

3.4 Tenderers shall permit and shall cause their agents (whether declared or not), subcontractors, sub-consultants, service providers, suppliers, and their personnel, to permit the Procuring Entity to inspect all accounts, records and other documents relating to any initial selection process, pre-qualification process, tender submission, proposal submission, and contract performance (in the case of award), and to have them audited by auditors appointed by the Procuring Entity.

4 Eligible Tenderers

4.1 A Tenderer may be a firm that is a private entity, a state-owned enterprise or institution subject to ITT 4.6, or any combination of such entities in the form of a joint venture (JV) under an existing agreement or with the intent to enter in to such an agreement supported by a Form of Intent. Public employees and their close relatives *(spouses, children, brothers, sisters and uncles and aunts)* are not eligible to participate in the tender. In the case of a joint venture, all members shall be jointly and severally liable for the execution of the contract in accordance with the

Contract terms. The JV shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the members of the JV during the Tendering process and, in the event the JV is awarded the contract, during contract execution. Members of a joint venture may not also make an individual tender, be a subcontractor in a separate tender or be part of another joint venture for the purposes of the same Tender. The maximum number of JV members shall be specified in the **TDS.**

4.2 Public Officers of the Procuring Entity, their Spouses, Child, Parent, Brothers or Sister. Child, Parent, Brother or Sister of a Spouse, their business associates or agents and firms / organizations in which they have a substantial or controlling interest shall not be eligible to tender or be awarded a contract. Public Officers are also not allowed to participate in any procurement proceedings.

4.3 A Tenderer shall not have a conflict of interest. Any Tenderer found to have a conflict of interest shall be disqualified. A Tenderer may be

considered to have a conflict of interest for the purpose of this Tendering process, if the Tenderer:

a. Directly or indirectly controls, is controlled by or is under common control with another Tenderer; or
b. Receives or has received any direct or indirect subsidy from another Tenderer; or
c. Has the same legal representative as another Tenderer; or
d. Has a relationship with another Tenderer, directly or through common third parties, that puts it in a position to influence the Tender of another Tenderer, or influence the decisions of the Procuring Entity regarding this Tendering process; or
e. Any of its affiliates participates as a consultant in the preparation of the design or technical specifications of the Information System that are the subject of the Tender; or
f. Or any of its affiliates has been hired (or is proposed to be hired) by the Procuring Entity or Procuring Entity as Project Manager for the Contract implementation; or
g. Would be providing goods, works, or non-consulting services resulting from or directly related to consulting services for the preparation or implementation of the project specified in the TDS ITT2.1 that it provided or were provided by any affiliate that directly or indirectly controls, is controlled by, or is under common control with that firm; or
h. Has a close business or family relationship with a professional staff of the Procuring Entity who:
    i. Are directly or in directly involved in the preparation of the tendering document or specifications of the Contract, and/ or the Tender evaluation process of such Contract. or
    ii. Would be involved in the implementation or supervision of such Contract unless the conflict stemming from such relationship has been resolved in a manner acceptable to the Procuring Entity throughout the Tendering process and execution of the Contract.

4.4 A firm that is a Tenderer (either individually or as a JV member) shall not participate as a Tenderer or as JV member in more than one

Tender except for permitted alternative Tenders. Such participation shall result in the disqualification of all Tenders in which the firm is involved. However, this does not limit the participation of a Tenderer as subcontractor in another Tender or of a firm as a subcontractor in more than one Tender.

4.5 A Tenderer may have the nationality of any country, subject to the restrictions pursuant to ITT4.9. A Tenderer shall be deemed to have the nationality of a country if the Tenderer is constituted, incorporated or registered in and operates in conformity with the provisions of the laws of that country, as evidenced by its articles of incorporation (or equivalent documents of constitution or association) and its registration documents, as the case maybe. This criterion also shall apply to the determination of the nationality of proposed sub-contractors or sub- consultants for any part of the Contract including related Services.

4.6 A Tenderer that has been debarred from participating in public procurement shall be ineligible to tender or be awarded a contract. The list of debarred firms and individuals is available from the website of PPRA www.ppra.go.ke.

4.7 Tenderers that are state-owned enterprises or institutions in Kenya may be eligible to compete and be awarded a Contract(s) only if they can establish that they (i) are legally and financially autonomous (ii) operate under commercial law, and (iii) are not under supervision of the Procuring Entity.

Firms and individuals may be ineligible if (a) as a matter of law or official regulations, Kenya prohibits commercial relations with that country, or (b) by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, Kenya prohibits any import of goods or contracting of works or services from that country, or any payments to any country, person, entity in that country.

4.8 The Procuring Entity may require tenderers to be registered with certain authorities in Kenya. Such registration shall be defined in the **TDS**, but care must be taken to ensure such registration requirement does not discourage competition, nor exclude competent tenderers.

Registration shall not be a condition for tender, but where a selected tenderer is not so registered, the tenderer shall be given opportunity to register before signing of the contract.

4.9 Foreign tenderers are required to source at least forty (40%) percent of their contract inputs (in supplies, subcontracts and labor) from national suppliers and contractors. To this end, a foreign tenderer shall provide in its tender documentary evidence that this requirement is met. Foreign tenderers not meeting this criterion will be automatically disqualified. Information required to enable the Procuring Entity to determine if this condition is met shall be provided in for this purpose is be provided in "SECTION III-EVALUATION AND QUALIFICATION CRITERIA, Item 9".

4.10 Pursuant to the eligibility requirements of ITT 4.11, a tenderer is considered a foreign tenderer, if it is registered in Kenya, has less than 51 percent ownership by nationals of Kenya and if it does not subcontract foreign contractors more than 10 percent of the contract price, excluding provisional sums. JVs are considered as foreign tenderers if the individual member firms are registered in Kenya have less than 51 percent ownership by nationals of Kenya. The JV shall not subcontract to foreign firms more than 10 percent of the contract price, excluding provisional sums.

4.11 The Competition Act of Kenya requires that firms wishing to tender as Joint Venture undertakings which may prevent, distort or lessen competition in provision of services are prohibited unless they are exempt in accordance with the provisions of Section 25 of the Competition Act, 2010. JVs will be required to seek for exemption from the Competition Authority. Exemption shall not be a condition for tender, but it shall be a condition of contract award and signature. A JV tenderer shall be given opportunity to seek such exemption as a condition of award and signature of contract. Application for exemption from the Competition Authority of Kenya may be accessed from the website www.cak.go.ke

4.12 Tenderers shall be considered ineligible for procurement if they offer goods, works and production processes with characteristics that have been declared by the relevant national environmental protection

agency or by other competent authority as harmful to human beings and to the environment.

4.13 A Kenyan tenderer shall be eligible to tender if it provides evidence of having fulfilled his/her tax obligations by producing a valid tax compliance certificate or tax exemption certificate issued by the Kenya Revenue Authority.

5 Eligible Goods and Services

5.1 The Information Systems to be supplied under the Contract may have their origin in any eligible country.

5.2 For the purposes of this tendering document, the term "Information System" means all:

i. the required information technologies, including all information processing and communications-related hardware, software, supplies, and consumable items that the Supplier is required to supply and install under the Contract, plus all associated documentation, and all other materials and goods to be supplied, installed, integrated, and made operational; and

ii. the related software development, transportation, insurance, installation, customization, integration, commissioning, training, technical support, maintenance, repair, and other services necessary for proper operation of the Information System to be provided by the selected Tenderer and as specified in the Contract.

5.3 For purposes of ITT 5.1 above, "origin" means the place where the goods and services making the Information System are produced in or supplied from. An Information System is deemed to be produced in a certain country when, in the territory of that country, through software development, manufacturing, or substantial and major assembly or integration of components, a commercially recognized product results that is substantially different in basic characteristics or in purpose or utility from its components.

5.4 Any goods, works and production processes with characteristics that have been declared by the relevant national environmental protection

agency or by other competent authority as harmful to human beings and to the environment shall not be eligible for procurement under this Act.

B. CONTENTS OF TENDERING DOCUMENT

6 Sections of Tendering Document

PART 1 - Tendering Procedures
Section I - Instructions to Tenderers (ITT)
Section II - Tender Data Sheet (TDS)
Section III - Evaluation and Qualification Criteria
Section IV - Tendering Forms

PART 2 - Procuring Entity's Requirements
Section V - Requirements of the Information Systems
Section VI - Technical Requirements
Section VII - Implementation Schedule
Section VIII - System Inventory Tables
Section IX - Background and Informational Materials

PART 3 - Contract
Section X - General Conditions of Contract
Section XII - Special Conditions of Contract
Section XIII - Contract Forms

6.1 The Invitation to Tender Notice issued by the Procuring Entity is not part of this tendering document.

6.2 Unless obtained directly from the Procuring Entity, the Procuring Entity is not responsible for the completeness of the document, responses to requests for clarification, the Minutes of the pre-Tender meeting (if any), or Addenda to the tendering document in accordance with ITT 10. In case of any contradiction, documents obtained directly from the Procuring Entity shall prevail.

6.3 The Tenderer is expected to examine all instructions, forms, terms, and specifications in the tendering document and to furnish with its Tender all information or documentation as is required by the

tendering document.

7 Site Visit

7.1 The Tenderer, at the Tenderer's own responsibility and risk, is encouraged to visit and examine the Site of the Required Services and its surroundings and obtain all information that may be necessary for preparing the Tender and entering into a contract for the Services. The costs of visiting the Site shall beat the Tenderer's own expense.

8 Pre-Tender Meeting and a pre- arranged pretender visit of the site of the works

8.1 The Procuring Entity shall specify in the **TDS** if a pre-tender conference will be held, when and where. The Procuring Entity shall also specify in the **TDS** if a pre-arranged pretender visit of the site of the works will be held and when. The Tenderer's designated representative is invited to attend a pre-arranged pretender visit of the site of the works. The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.

8.2 The Tenderer is requested to submit any questions in writing, to reach the Procuring Entity not later than the period specified in the **TDS** before the meeting.

8.3 Minutes of the pre-Tender meeting and the pre-arranged pre-tender visit of the site of the works, if applicable, including the text of the questions asked by Tenderers and the responses given, together with any responses prepared after the meeting, will be transmitted promptly to all Tenderers who have acquired the Tender Documents in accordance with ITT 6.3. Minutes shall not identify the source of the questions asked.

8.4 The Procuring Entity shall also promptly publish anonymized (*no names*) Minutes of the pre-Tender meeting and the pre-arranged pre-tender visit of the site of the works at the web page identified **in the TDS**. Any modification to the Tender Documents that may become necessary as a result of the pre-Tender meeting shall be made by the

Procuring Entity exclusively through the issue of an Addendum pursuant to ITT 10 and not through the minutes of the pre-Tender meeting. Nonattendance at the pre-Tender meeting will not be a cause for disqualification of a Tenderer.

9 Clarification of Tender Documents

9.1 A Tenderer requiring any clarification of the Tender Document shall contact the Procuring Entity in writing at the Procuring Entity's address specified in the TDS or raise its enquiries during the pre-Tender meeting and the pre- arranged pretender visit of the site of the works if provided for in accordance with ITT 8.4. The Procuring Entity will respond in writing to any request for clarification, provided that such request is received no later than the period specified in the TDS prior to the deadline for submission of tenders. The Procuring Entity shall forward copies of its response to all tenderers who have acquired the Tender Documents in accordance with ITT 6.3, including a description of the inquiry but without identifying its source. If so specified in the **TDS**, the Procuring Entity shall also promptly publish its response at the web page identified in the **TDS**. Should the clarification resulting changes to the essential elements of the Tender Documents, the Procuring Entity shall amend the Tender Documents appropriately following the procedure under ITT 10.

10 Amendment of Tendering Document

10.1 At any time prior to the deadline for submission of Tenders, the Procuring Entity may amend the Tendering document by issuing addenda.

10.2 Any addendum issued shall be part of the tendering document and shall be communicated in writing to all who have obtained the tendering document from the Procuring Entity in accordance with ITT 6.3. The Procuring Entity shall also promptly publish the addendum on the Procuring Entity's webpage in accordance with ITT 8.1.

10.3 To give prospective Tenderers reasonable time in which to take an

addendum into account in preparing their Tenders, the Procuring Entity shall extend, as necessary, the deadline for submission of Tenders, in accordance with ITT 24.2 below.

C. PREPARATION OF TENDERS

11 Cost of Tendering

11.1 The Tenderer shall bear all costs associated with the preparation and submission of its Tender, and the Procuring Entity shall not be responsible or liable for those costs, regardless of the conduct or outcome of the Tendering process.

12 Language of Tender

12.1 The Tender, as well as all correspondence and documents relating to the tender exchanged by the Tenderer and the Procuring Entity, shall be written in the English language**.** Supporting documents and printed literature that are part of the Tender may be in another language provided they are accompanied by an accurate translation of the relevant passages in the English language, in which case, for purposes of interpretation of the Tender, such translation shall govern.

13 Documents Comprising the Tender

13.1 The Tender submitted by the Tenderer shall comprise the following:

a. **Form of Tender** prepared in accordance with ITT 14;
b. **Price Schedules** completed in accordance with ITT 14 and ITT 16;
c. **Tender Security or Tender-Securing Declaration** in accordance with ITT 22;
d. **Alternative Tender:** if permissible, in accordance with ITT 15;
e. **Authorization:** written confirmation authorizing the signatory of the Tender to commit the Tenderer, in accordance with ITT 23.3;
f. **Eligibility of Information System:** documentary evidence established in accordance with ITT 16.1 that the Information System offered by the Tenderer in its Tender or in any alternative Tender, if permitted, are eligible;

g. **Tenderer's Eligibility:** documentary evidence in accordance with ITT 17 establishing the Tenderer's eligibility and qualifications to perform the contract if its Tender is accepted;

h. **Conformity:** documentary evidence established in accordance with ITT 18 that the Information System offered by the Tenderer conform to the tendering document;

i. **Subcontractors:** list of subcontractors, in accordance with ITT 18.4;

j. **Intellectual Property**: a list of: Intellectual Property as defined in GCC Clause 15;

i) All Software included in the Tender, assigning each item to one of the software categories defined in GCC Clause1.1(C):

a. System, General Purpose, and Application Software; or

b. Standard and Custom Software;

iii. All Custom Materials, as defined in GCCClause1.1(c), included in the Tender;

All Materials not identified as Custom Materials shall be deemed Standard Materials, as defined in GCC Clause 1.1 (c); Re-assignments among the Software and Materials categories, if necessary, will be made during the implementation of the Contract according to GCC Clause 39 (Changes to the Information System); and

k. Any other document required **in the TDS.**

13.2 In addition to the requirements under ITT 13.1, Tenders submitted by a JV shall include a copy of the Joint Venture Agreement entered into by all members indicating at least the parts of the Information System to be executed by the respective members. Alternatively, a Form of intent to execute a Joint Venture Agreement in the information System to be executed by the respective members.

13.3 The Tenderer shall furnish in the Form of Tender information on commissions and gratuities, if any, paid or to be paid to agents or any other party relating to this Tender. The Tenderer shall serialize page so fall tender documents submitted.

14 Form of Tender and Price Schedules

14.1 The Tenderer shall complete the Form of Tender, including the appropriate Price Schedules, using the relevant forms furnished in Section IV, Tendering Forms. The forms must be completed without any alterations to the text, and no substitutes shall be accepted except as provided under ITT 21.3. All blank spaces shall be filled in with the information requested. The Tenderer shall chronologically serialize all pages of the tender documents submitted.

15 Alternative Tenders

15.1 The TDS indicates whether alternative Tenders are allowed. If they are allowed, the **TDS** will also indicate whether they are permitted in accordance with ITT 13.3, or invited in accordance with ITT 13.2 and/or ITT 13.4.

15.2 When alternatives to the Time Schedule are explicitly invited, a statement to that effect will be included **in the TDS**, and the method of evaluating different time schedules will be described in Section III, Evaluation and Qualification Criteria.

15.3 Except as provided under ITT 15.4 below, Tenderers wishing to offer technical alternatives to the Procuring Entity's requirements as described in the tendering document must also provide: (i) a price at which they are prepared to offer an Information System meeting the Procuring Entity's requirements; and (ii) all information necessary for a complete evaluation of the alternatives by the Procuring Entity, including drawings, design calculations, technical specifications, breakdown of prices, and proposed installation methodology and other relevant details. Only the technical alternatives, if any, of the Tenderer with the Best Evaluated Tender conforming to the basic technical requirements shall be considered by the Procuring Entity.

15.4 When Tenderers are invited **in the TDS** to submit alternative technical solutions for specified parts of the system, such parts shall be described in Section V, Procuring Entity's Requirements. Technical alternatives that comply with the performance and

technical criteria specified for the Information System shall be considered by the Procuring Entity on their own merits, pursuant to ITT 35.

16 Documents Establishing the Eligibility of the Information System

16.1 To establish the eligibility of the Information System in accordance with ITT 5, Tenderers shall complete the country-of-origin declarations in the Price Schedule Forms, included in Section IV, Tendering Forms.

17 Documents Establishing the Eligibility and Qualifications of the Tenderer

17.1 To establish its eligibility and qualifications to perform the Contracting accordance with Section III, Evaluation and Qualification Criteria, the Tenderer shall provide the information requested in the corresponding information sheets included in Section IV, Tendering Forms.

17.2 In the event that pre-qualification of potential Tenderers has been undertaken as stated **in the TDS**, only Tenders from pre-qualified Tenderers shall be considered for award of Contract. These qualified Tenderers should submit with their Tenders any information updating their original pre-qualification applications or, alternatively, confirm in their Tenders that the originally submitted pre-qualification information remains essentially correct as of the date of Tender submission.

17.3 Tenderers shall be asked to provide, as part of the data for qualification, such information, including details of ownership, as shall be required to determine whether, according to the classification established by the Procuring Entity, a particular contractor or group of contractors qualifies for a margin of preference. Further the information will enable the Procuring Entity identify any actual or potential conflict of interest in relation to the procurement and/or contract management processes, or a possibility of collusion between tenderers, and thereby help to prevent any corrupt influence in

relation to the procurement process or contract management.

17.4 The purpose of the information described in ITT 15.1 above overrides any claims to confidentiality which a tenderer may have. There can be no circumstances in which it would be justified for a tenderer to keep information relating to its ownership and control confidential where it is tendering to undertake public sector work and receive public sector funds. Thus, confidentiality will not be accepted by the Procuring Entity as a justification for a Tenderer's failure to disclose, or failure to provide required information on its ownership and control.

17.5 The Tenderer shall provide further documentary proof, information or authorizations that the Procuring Entity may request in relation to ownership and control, any changes to the information which was provided by the tenderer under ITT 6.3. The obligations to require this information shall continue for the duration of the procurement process and contract performance and after completion of the contract, if any change to the information previously provided may reveal a conflict of interest in relation to the award or management of the contract.

17.6 All information provided by the tenderer pursuant to these requirements must be complete, current and accurate as at the date of provision to the Procuring Entity. In submitting the information required pursuant to these requirements, the Tenderer shall warrant that the information submitted is complete, current and accurate as at the date of submission to the Procuring Entity.

17.7 If a tenderer fails to submit the information required by these requirements, its tenderer will be rejected. Similarly, if the Procuring Entity is unable, after taking reasonable steps, to verify to a reasonable degree the information submitted by a tenderer pursuant to these requirements, then the tender will be rejected.

17.8 If information submitted by a tenderer pursuant to these requirements, or obtained by the Procuring Entity (whether through its own enquiries, through notification by the public or otherwise), shows any conflict of interest which could materially and improperly

benefit the tenderer in relation to the procurement or contract management process, then:

a. If the procurement process is still ongoing, the tenderer will be disqualified from the procurement process,
b. If the contract has been awarded to that tenderer, the contract award will be set aside,
c. the tenderer will be referred to the relevant law enforcement authorities for investigation of whether the tenderer or any other persons have committed any criminal offence.

17.9 If a tenderer submits information pursuant to these requirements that is in complete, inaccurate or out-of-date, or attempts to obstruct the verification process, then the consequences ITT 6.7 will ensue unless the tenderer can show to the reasonable satisfaction of the Procuring Entity that any such act was not material or was due to genuine error which was not attributable to the intentional act, negligence or recklessness of the tenderer.

18 Documents Establishing Conformity of the Information System

18.1 Pursuant to ITT 11.1(h), the Tenderer shall furnish, as part of its Tender documents establishing the conformity to the tendering documents of the Information System that the Tenderer proposes to design, supply and install under the Contract.

18.2 The documentary evidence of conformity of the Information System to the tendering documents including:

a) Preliminary Project Plan describing, among other things, the methods by which the Tenderer will carry out its overall management and coordination responsibilities if awarded the Contract, and the human and other resources the Tenderer proposes to use. The Preliminary Project Plan must also address any other topics **specified in the TDS**. In addition, the Preliminary Project Plan should state the Tenderer's assessment of what it expects the Procuring Entity and any other party involved in the implementation of the Information System to provide during implementation and how the Tenderer proposes to coordinate the activities of all involved parties;

b) Written confirmation that the Tenderer accepts responsibility for the successful integration and inter- operability of all components of the Information System as required by the tendering documents;

c) An item-by-item commentary on the Procuring Entity's Technical Requirements, demonstrating the substantial responsiveness of the Information System offered to those requirements. In demonstrating responsiveness, the Tenderer is encouraged to use the Technical Responsiveness Checklist (or Checklist Format) in the Sample Tendering Forms (Section IV). The commentary shall include explicit cross- references to the relevant pages in the supporting materials included in the tender. Whenever a discrepancy arises between the item-by-item commentary and any catalogs, technical specifications, or other preprinted materials submitted with the tender, the item-by-item commentary shall prevail;

d) Support material (e.g., product literature, white papers, narrative descriptions of technologies and/or technical approaches), as required and appropriate; and

e) Any separate and enforceable contract(s) for Recurrent Cost items which the TDS ITT 17.2 required Tenderers to tender.

18.3 References to brand names or model numbers or national or proprietary standards designated by the Procuring Entity in the tendering documents are intended to be descriptive and not restrictive. Except where explicitly prohibited in the **TDS** for specific items or standards, the Tenderer may substitute alternative brand /model names or standards in its tender, provided that it demonstrates to the Procuring Entity's satisfaction that the use of the substitute(s) will result in the Information System being able to perform substantially equivalent to or better than that specified in the Technical Requirements.

18.4 For major items of the Information System as listed by the Procuring Entity in Section III, Evaluation and Qualification Criteria, which the Tenderer intends to purchase or subcontract, the Tenderer shall give details of the name and nationality of the proposed subcontractors,

including manufacturers, for each of those items. In addition, the Tenderer shall include in its Tender information establishing compliance with the requirements specified by the Procuring Entity for these items. Quoted rates and prices will be deemed to apply to whichever subcontractor is appointed, and no adjustment of the rates and prices will be permitted.

18.5 The Tenderer shall be responsible for ensuring that any subcontractor proposed complies with the requirements of ITT 4, and that any goods or services to be provided by the subcontractor comply with the requirements of ITT 5 and ITT 16.1.

19 Tender Prices

19.1 All Goods and Services identified in the Supply and Installation Cost Sub-Tables in System Inventory Tables in Section VII, and all other Goods and Services proposed by the Tenderer to fulfill the requirements of the Information System, must be priced separately and summarized in the corresponding cost tables in the Sample Tendering Forms (Section IV), in accordance with the instructions provided in the tables and in the manner specified below.

19.2 **Unless otherwise specified in the TDS**, the Tenderer must also tender Recurrent Cost Items specified in the Technical Requirements, Recurrent Cost Sub-Table of the System Inventory Tables in Section VII (if any). These must be priced separately and summarized in the corresponding cost tables in the Sample Tendering Forms (Section IV), in accordance with the instructions provided in the tables and in the manner specified below:

a) **If specified in the TDS,** the Tenderer must also tender separate enforceable contracts for the Recurrent Cost Items not included in the main Contract;

b) Prices for Recurrent Costs are all-inclusive of the costs of necessary Goods such as spare parts, software license renewals, labor, etc., needed for the continued and proper operation of the Information System and, if appropriate, of the Tenderer's own

allowance for price increases;

c) Prices for Recurrent Costs beyond the scope of warranty services to be incurred during the Warranty Period, defined in GCC Clause 29.4 and prices for Recurrent Costs to be incurred during the Post-Warranty Period, defined in SCC Clause 1.1. (e) (xiii), shall be quoted as Service prices on the Recurrent Cost Sub-Table in detail, and on the Recurrent Cost Summary Table in currency totals

19.3 Unit prices must be quoted at a level of detail appropriate for calculation of any partial deliveries or partial payments under the contract, in accordance with the Implementation Schedule in Section VII), and with GCC and SCC Clause 12 – Terms of Payment. Tenderers may be required to provide a breakdown of any composite or lump-sum items included in the Cost Tables

19.4 The price of items that the Tenderer has left blank in the cost tables provided in the Sample Tender Forms (Section IV) shall be assumed to be included in the price of other items. Items omitted altogether from the cost tables shall be assumed to be omitted from the tender and, provided that the tender is substantially responsive, an adjustment to the tender price will be made during tender evaluation in accordance with ITT 31.3.

19.5 The prices for Goods components of the Information System are to be expressed and shall be defined and governed in accordance with the rules prescribed in the edition of incoterms **specified in the TDS,** as follows:

a) Goods supplied from outside Kenya:
Unless otherwise specified in the TDS, the prices shall be quoted on a CIP (named place of destination) basis, exclusive of all taxes, stamps, duties, levies, and fees imposed in Kenya. The named place of destination and special instructions for the contract of carriage are as specified in the SCC for GCC 1.1(e) (iii)**.** In quoting the price, the Tenderer shall be free to use transportation through carriers registered in any eligible countries. Similarly, the Tenderer may obtain insurance services

from any eligible source country;

b) Locally supplied Goods: Unit prices of Goods offered from within Kenya, shall be quoted on an EXW (ex- factory, ex works, ex ware house or off- the-shelf, as applicable) basis, including all customs duties, levies, fees, sales and other taxes incurred until delivery of the Goods, but excluding all VAT or sales and other taxes and duties/fees incurred for the Goods at the time of invoicing or sales transaction, if the Contract is awarded; and

c) Inland transportation.

19.6 Unless otherwise stated in the **TDS,** inland transportation, insurance and related local costs incidental to the delivery of the Goods to the designated Project Sites must be quoted separately as a Service item in accordance with ITT 17.5, whether the Goods are to be supplied locally or from outside Kenya, except when these costs are already included in the price of the Goods, as is, e.g., the case, when ITT 17.5 (a) specifies CIP, and the named places of destination are the Project Sites.

19.7 The price of Services shall be separated into their local and foreign currency components and where appropriate, broken down into unit prices. Prices must include all taxes, duties, levies and fees whatsoever, except only VAT or other indirect taxes, or stamp duties, that may be assessed and/ or apply in Kenyan /to the price of the Services invoiced to the Procuring Entity, if the Contract is awarded.

19.8 Unless otherwise specified in the **TDS**, the prices must include all costs incidental to the performance of the Services, as incurred by the Supplier, such as travel, subsistence, office support, communications, translation, printing of materials, etc. Costs incidental to the delivery of the Services but incurred by the Procuring Entity or its staff, or by third parties, must be included in the price only to the extent such obligations are made explicit in these tendering documents (as, e.g., a requirement for the Tenderer to include the travel and subsistence costs of trainees).

19.9 Unless otherwise specified in the **TDS,** prices quoted by the Tenderer shall be fixed during the Tenderer's performance of the Contract and

not subject to increases on any account. Tenders submitted that are subject to price adjustment will be rejected.

20 Currencies of Tender and Payment

20.1 The currency(ies) of the Tender and currencies of payment shall be the same. The Tenderer shall quote in Kenya shillings the portion of the Tender price that corresponds to expenditures incurred in Kenya currency, unless otherwise specified **in the TDS**

20.2 The Tenderer may express the Tender price in any currency. If the Tenderer wishes to be paid in a combination of amounts in different currencies, it may quote its price accordingly but shall use no more than **two foreign currencies** in addition to Kenyan currency.

21 Period of Validity of Tenders

21.1 Tenders shall remain valid for the period specified **in the TDS** after the Tender submission deadline date prescribed by the Procuring Entity in accordance with ITT 23.1. A Tender valid for a shorter period shall be rejected by the Procuring Entity as non-responsive.

21.2 In exceptional circumstances, prior to the expiration of the Tender validity period, the Procuring Entity may request Tenderers to extend the period of validity of their Tenders. The request and the responses shall be made in writing. If a Tender Security is requested in accordance with ITT 20.1, it shall also be extended for thirty days (30) beyond the deadline of the extended validity period. A Tenderer may refuse the request without forfeiting its Tender Security. A Tenderer granting the request shall not be required or permitted to modify its Tender, except as provided in ITT 19.3.

22 Tender Security

22.1 The Tenderer shall furnish as part of its Tender, either a Tender-Securing Declaration or a Tender Security as specified **in the TDS**, in original form and, in the case of a Tender Security, in the amount and currency specified **in the TDS**.

22.2 A Tender-Securing Declaration shall use the form included in

Section IV, Tendering Forms.

22.3 If a Tender Security is specified pursuant to ITT 20.1, the tender security shall be a demand guarantee in any of the following forms at the Tenderer's option:

a. cash;

b. a bank guarantee;

c. a guarantee by an insurance company registered and licensed by the Insurance Regulatory Authority listed by the Authority; or

d. a guarantee issued by a financial institution approved and licensed by the Central Bank of Kenya,

e. any other form specified in the **TDS.**

If an unconditional guarantee is issued by a non-bank financial institution located outside Kenya, the issuing non-bank financial institution shall have a correspondent financial institution located in Kenya to make it enforceable unless the Procuring Entity has agreed in writing, prior to Tender submission, that a correspondent financial institution is not required.

22.4 In the case of a bank guarantee, the Tender Security shall be submitted either using the Tender Security Form included in Section IV, Tendering Forms or in another substantially similar format approved by the Procuring Entity prior to Tender submission. I neither case, the form must include the complete name of the Tenderer. The Tender Security shall be valid for thirty days (30) beyond the original validity period of the Tender, or beyond any period of extension if requested under ITT 19.2.

22.5 If a Tender Security or a Tender-Securing Declaration is specified pursuant to ITT 20.1, any Tender not accompanied by a substantially responsive Tender Security or Tender-Securing Declaration shall be rejected by the Procuring Entity as non-responsive.

22.6 The Tender Security shall be returned/release as promptly as possible

a) The procurement proceedings are terminated;

b) The procuring entity determines that none of the submitted tenders is responsive;

c) A bidder declines to extend the tender validity.

d) Once the successful Tenderer has signed the Contract and furnished the required Performance Security.

22.7 The Tender Security may be forfeited or the Tender-Securing Declaration executed:

a) if a Tenderer withdraws its Tender during the period of Tender validity specified by the Tenderer on the Form of Tender; or

b) if the successful Tenderer fails to**:**

i) sign the Contract in accordance with ITT 47; or

ii) furnish a performance security in accordance with ITT 48.

22.8 Where the Tender-Securing Declaration is executed the Procuring Entity will recommend to the PPRA to debars the Tenderer from participating in public procurement as provided in the law.

22.9 The Tender Security or the Tender-Securing Declaration of a JV shall be in the name of the JV that submits the tender. If the JV has not been legally constituted into a legally enforceable JV at the time of Tendering, the Tender Security or the Tender-Securing Declaration shall be in the names of all future members as named in the Form of intent referred to in ITT 4.1 and ITT 11.2.

22.10 A tenderer shall not issue a tender security to guarantee itself.

23 Format and Signing of Tender

23.1 The Tenderer shall prepare one original of the documents comprising the Tender as described in ITT 11 and clearly mark it “ORIGINAL.” Alternative Tenders, if permitted in accordance with ITT 13, shall be clearly marked “ALTERNATIVE”. In addition, the Tenderer shall submit copies of the Tender, in the number specified **in the TDS** and clearly mark them “COPY.” In the event of any discrepancy between the original and the copies, the original shall prevail.

23.2 Tenderers shall mark as “CONFIDENTIAL” information in their Tenders which is confidential to their business. This may include proprietary information, trade secrets, or commercial or financially sensitive information.

23.3 The original and all copies of the Tender shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Tenderer. This authorization shall consist of a written confirmation as specified **in the TDS** and shall be attached to the Tender. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the Tender where entries or amendments have been made shall be signed or initialed by the person signing the Tender.

23.4 In case the Tenderer is a JV, the Tender shall be signed by an authorized representative of the JV on behalf of the JV, and so as to be legally binding on all the members as evidenced by a power of attorney signed by their legally authorized representatives.

23.5 Any interlineations, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the Tender.

D. SUBMISSION AND OPENING OF TENDERS

24 Submission, Sealing and Marking of Tenders

24.1 The Tenderer shall deliver the Tender in a single, sealed envelope (one (1) envelope process). Within the single envelope the Tenderer shall place the following separate, sealed envelopes:

a) In an envelope marked "ORIGINAL", all documents comprising the Tender, as described in ITT 11; and

b) In an envelope marked "COPIES", all required copies of the Tender; and,

c) If alternative Tenders are permitted in accordance with ITT 13, and if relevant:

i) In an envelope marked "ORIGINAL–ALTERNATIVE TENDER", the alternative Tender; and

ii) in the envelope marked "COPIES – ALTERNATIVE TENDER" all required copies of the alternative Tender.

24.2 The inner envelopes shall:

a) Bear the name and address of the Tenderer;

b) Be addressed to the Procuring Entity/ Employer in accordance

with ITT 23.1;

c) Bear the specific identification of this Tendering process specified in accordance with ITT 1.1; and

d) Bear a warning not to open before the time and date for Tender opening.

The outer envelopes shall:

e) Be addressed to the Procuring Entity/ Employer in accordance with ITT 23.1;

f) Bear the specific identification of this Tendering process specified in accordance with ITT 1.1; and bear a warning not to open before the time and date for Tender opening.

24.3 If all envelopes are not sealed and marked as required, the Procuring Entity will assume no responsibility for the misplacement or premature opening of the Tender. Tenders that are misplaced or opened prematurely will not be accepted.

25 Deadline for Submission of Tenders

25.1 Tenders must be received by the Procuring Entity at the address and no later than the date and time indicated **in the TDS**. When so specified **in the TDS**, Tenderers shall have the option of submitting their Tenders electronically. Tenderers submitting Tenders electronically shall follow the electronic Tender submission procedures specified **in the TDS**.

25.2 The Procuring Entity may, at its discretion, extend this deadline for submission of Tenders by amending the tendering documents in accordance with ITT 8, in which case all rights and obligations of the Procuring Entity and Tenderers will thereafter be subject to the deadline as extended.

26 Late Tenders

26.1 The Procuring Entity shall not consider any Tender that arrives after the deadline for submission of Tenders, in accordance with ITT 23. Any Tender received by the Procuring Entity after the deadline for submission of Tenders shall be declared late, rejected, and returned

unopened to the Tenderer.

27 Withdrawal, Substitution, and Modification of Tenders

27.1 A Tenderer may withdraw, substitute, or modify its Tender after it has been submitted by sending a written notice, duly signed by an authorized representative, and shall include a copy of the authorization in accordance with ITT 21.3, (except that withdrawal notices do not require copies). The corresponding substitution or modification of the Tender must accompany the respective written notice. All notices must be:

a) prepared and submitted in accordance with ITT 21 and ITT 22 (except that withdrawals notices do not require copies), and in addition, the respective envelopes shall be clearly marked "WITHDRAWAL," "SUBSTITUTION," "MODIFICATION;" and

b) received by the Procuring Entity prior to the deadline prescribed for submission of Tenders, in accordance with ITT23.

27.2 Tenders requested to be withdrawn in accordance with ITT 25.1 shall be returned unopened to the Tenderers.

27.3 No Tender may be withdrawn, substituted, or modified in the interval between the deadline for submission of Tender sand the expiration of the period of Tender validity specified by the Tenderer on the Form of Tender or any extension thereof.

28 Tender Opening

28.1 Except as in the cases specified in ITT 24 and ITT 25.2, the Procuring Entity shall conduct the Tender opening in public, in the presence of Tenderers' designated representatives who chooses to attend, and at the address, date and time specified **in the TDS**. Any specific electronic Tender opening procedures required if electronic tendering is permitted in accordance with ITT 23.1, shall be as specified **in the TDS**.

28.2 First, envelopes marked "WITHDRAWAL" shall be opened and read out and the envelopes with the corresponding Tender shall not be

opened but returned to the Tenderer. No Tender withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and is read out at Tender opening.

28.3 Envelopes marked "Modification" shall be opened and read out with the corresponding Tender. No Tender modification shall be permitted unless the corresponding modification notice contains a valid authorization to request the modification and is read out at Tender opening. Only Tenders that are opened and read out at Tender opening shall be considered further.

28.4 Next, all remaining envelopes shall be opened one at a time, reading out: the name of the Tenderer and the Tender Price(s), including any discounts and alternative Tenders, and indicating whether there is a modification; the presence or absence of a Tender Security or Tender-Securing Declaration; and any other details as the Procuring Entity may consider appropriate.

28.5 Only Tenders, alternative Tenders and discounts that are opened and read out at Tender opening shall be considered further in the evaluation. The Form of Tender and the Price Schedules are to be initialed by representatives of the Procuring Entity attending Tender opening in the manner specified **in the TDS**.

28.6 The Procuring Entity shall neither discuss the merits of any Tender nor reject any Tender (except for late Tenders, in accordance with ITT 24.1).

28.7 The Procuring Entity shall prepare a record of the Tender opening that shall include, as a minimum:

a) The name of the Tenderer and whether there is a withdrawal, substitution, or modification;

b) The Tender Price, per lot if applicable, including any discounts;

c) Any alternative Tenders; and

d) The presence or absence of a Tender Security or a Tender-Securing Declaration.

28.8 The Tenderers' representatives who are present shall be requested to

sign the minutes. The omission of a Tenderer's signature on the minutes shall not invalidate the contents and effect of the minutes. A copy of the tender opening register shall be distributed to all Tenderers upon request.

E. EVALUATION AND COMPARISON OF TENDERS

29 Confidentiality

29.1 Information relating to the evaluation of Tenders and recommendation of contract award, shall not be disclosed to Tenderers or any other persons not officially concerned with the Tendering process until the Notification of Intention to Award the Contract is transmitted to all Tenderers in accordance with ITT 42.

29.2 Any effort by a Tenderer to influence the Procuring Entity in the evaluation of the Tenders or Contract award decisions may result in the rejection of its Tender.

29.3 Not with standing ITT 27.2, from the time of Tender opening to the time of Contract award, if any Tenderer wishes to contact the Procuring Entity on any matter related to the Tendering process, it should do so in writing.

30 Clarification of Tenders

30.1 To assist in the examination, evaluation, and comparison of the Tenders, and qualification of the Tenderers, the Procuring Entity may, at its discretion, ask any Tenderer for a clarification of its Tender. Any clarification submitted by a Tenderer that is not in response to a request by the Procuring Entity shall not be considered. The Procuring Entity's request for clarification and the response shall be in writing. No change in the prices or substance of the Tender shall be sought, offered, or permitted, except to confirm the correction of arithmetic errors discovered by the Procuring Entity in the evaluation of the Tenders, in accordance with ITT32.

30.2 If a Tenderer does not provide clarifications of its Tender by the date and time set in the Procuring Entity's request for clarification, its Tender may be rejected.

31 Deviations, Reservations, and Omissions

31.1 During the evaluation of Tenders, the following definitions apply:

a) "Deviation" is a departure from the requirements specified in the tendering document;

b) "Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the tendering document; and

c) "Omission" is the failure to submit part, or all of the information or documentation required in the tendering document.

32 Determination of Responsiveness

32.1 The Procuring Entity's determination of a Tender's responsiveness is to be based on the contents of the Tender itself, as defined in ITT 11.

32.2 A substantially responsive Tender is one that meets the requirements of the tendering document without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that;

a) If accepted, would:

i) Affect in any substantial way the scope, quality, or performance of the Information System specified in the Contract; or

ii) Limit in any substantial way, in consistent with the tendering document, the Procuring Entity's rights or the Tenderer's obligations under the proposed Contract; or

b) if rectified, would unfairly affect the competitive position of other Tenderers presenting substantially responsive Tenders.

32.3 The Procuring Entity shall examine the technical aspects of the Tender in particular, to confirm that all requirements of Section V, Procuring Entity's Requirements have been met without any material deviation, reservation, or omission.

32.4 To be considered for Contract award, Tenderers must have submitted Tenders:

a) for which detailed Tender evaluation using the same standards

for compliance determination as listed in ITT 29 and ITT 30.3 confirms that the Tenders are commercially and technically responsive, and include the hardware, Software, related equipment, products, Materials, and other Goods and Services components of the Information System in substantially the full required quantities for the entire Information System or, if allowed in the TDS ITT 35.8, the individual Subsystem, lot or slice Tender on; and are deemed by the Procuring Entity as commercially and technically responsive; and

b) that offer Information Technologies that are proven to perform up to the standards promised in the tender by having successfully passed the performance, benchmark, and/or functionality tests the Procuring Entity may require, pursuant to ITT 39.3.

33 Non-material non-conformities

33.1 Provided that a Tender is substantially responsive, the Procuring Entity may waive any nonconformity in the Tender that does not constitute a material deviation, reservation, or omission.

33.2 Provided that a Tender is substantially responsive, the Procuring Entity may request that the Tenderer submit the necessary information or documentation, within a reasonable period, to rectify nonmaterial non- conformities in the Tender related to documentation requirements. Requesting information or documentation on such non-conformities shall not be related to any aspect of the price of the Tender. Failure of the Tenderer to comply with the request may result in the rejection of its Tender.

33.3 Provided that a Tender is substantially responsive, the Procuring Entity shall rectify quantifiable nonmaterial non-conformities related to the Tender Price. To this effect, the Tender Price shall be adjusted, for comparison purposes only, to reflect the price of a missing or non-conforming item or component in the manner specified **in the TDS**.

34 Correction of Arithmetical Errors

34.1 The tender sum as submitted and read out during the tender opening shall be absolute and final and shall not be the subject of correction,

adjustment or amendment in anyway by any person or entity.

34.2 Provided that the Tender is substantially responsive, the Procuring Entity shall handle errors on the following basis:

a) Any error detected if considered a major deviation that affects the substance of the tender, shall lead to disqualification of the tender as non-responsive.

b) Any errors in the submitted tender a rising from a miscalculation of unit price, quantity, subtotal, and total bid price shall be considered as a major deviation that affects the substance of the tender and shall lead to disqualification of the tender as non-responsive. and

c) If there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail.

35 Conversion to Single Currency

35.1 For evaluation and comparison purposes, the currency(ies) of the Tender shall be converted into a single currency as specified **in the TDS**.

36 Margin of Preference and Reservations

36.1 A margin of preference on local contractors may be allowed only when the contract is open to international competitive tendering where foreign contractors are expected to participate in the tendering process and where the contract exceeds the value/ threshold specified in the Regulations.

36.2 A margin of preference shall not be allowed unless it is specified so in the **TDS**.

36.3 Contracts procured on basis of international competitive tendering shall not be subject to reservations exclusive to specific groups as provided in ITT 34.4.

36.4 Where it is intended to reserve a contract to a specific group of

businesses (these groups are Small and Medium Enterprises, Women Enterprises, Youth Enterprises and Enterprises of persons living with disability, as the case maybe), and who are appropriately registered as such by the authority to be specified in the **TDS**, a procuring entity shall ensure that the invitation to tender specifically indicates in the **TDS** that only businesses or firms belonging to the specified group are eligible to tender. No tender shall be reserved to more than one group. If not so stated in the Invitation to Tender and in the Tender documents, the invitation to tender will be open to all interested tenderers.

37 Evaluation of Tenders

37.1 The Procuring Entity shall use the criteria and methodologies listed in this ITT and Section III, Evaluation and Qualification criteria. No other evaluation criteria or methodologies shall be permitted. By applying the criteria and methodologies the Procuring Entity shall determine the Best Evaluated Tender.

37.2 To evaluate a Tender, the Procuring Entity shall consider the following:

a) Price adjustment due to discounts offered in accordance with ITT 14.4;

b) converting the amount resulting from applying (a) and (b) above, if relevant, to a single currency in accordance with ITT 33;

c) price adjustment due to quantifiable nonmaterial non-conformities in accordance with ITT 31.3; and

d) any additional evaluation factors specified **in the TDS** and Section III, Evaluation and Qualification Criteria.

38 Preliminary Examination

38.1 The Procuring Entity will examine the tenders, to determine whether they have been properly signed, whether required sureties have been furnished, whether any computational errors have been made, whether required sure ties have been furnished and are substantially complete (e.g., not missing key parts of the tender or silent on excessively large portions of the Technical Requirements). In the

case where a pre-qualification process was undertaken for the Contract (s) for which these tendering documents have been issued, the Procuring Entity will ensure that each tender is from a pre-qualified Tenderer and, in the case of a Joint Venture, that partners and structure of the Joint Venture are unchanged from those in the pre-qualification.

39 Technical Evaluation

39.1 The Procuring Entity will examine the information supplied by the Tenderers Pursuant to ITT 11 and ITT 16, and in response to other requirements in the Tendering document, considering the following factors:

a) Overall completeness and compliance with the Technical Requirements; and deviations from the Technical Requirements.

b) suitability of the Information System offered in relation to the conditions prevailing at the site; and the suitability of the implementation and other services proposed, as described in the Preliminary Project Plan included in the tender.

c) achievement of specified performance criteria by the Information System.

d) compliance with the time schedule called for by the Implementation Schedule and any alternative time schedules offered by Tenderers, as evidenced by a milestone schedule provided in the Preliminary Project Plan included in the tender.

e) type, quantity, quality, and long-term availability of maintenance services and of any critical consumable items necessary for the operation of the Information System.

f) any other relevant technical factors that the Procuring Entity deems necessary or prudent to take into consideration.

g) any proposed deviations in the tender to the contractual and technical provisions stipulated in the tendering documents.

39.2 The Procuring Entity's evaluation of tenders will consider technical factors, in addition to cost factors. The Technical Evaluation will be conducted following the Criteria specified in Section III, Evaluation and Qualification Criteria, which permits a comprehensive

assessment of the technical merits of each Tender. All tenders that fail to pass this evaluation will be considered non-responsive and will not be evaluated further.

39.3 Where alternative technical solutions have been allowed in accordance with ITT 13, and offered by the Tenderer, the Procuring Entity will make a similar evaluation of the alternatives. Where alternatives have not been allowed but have been offered, they shall be ignored.

39.4 Where the tender involves multiple lots or contracts, the tenderer will be allowed to tender for one or more lots (contracts). Each lot or contract will be evaluated in accordance with ITT 35.2. The methodology to determine the lowest evaluated tenderer or tenderers based one lot (contract) or based on a combination of lots (contracts), will be specified in Section III, Evaluation and Qualification Criteria. In the case of multiple lots or contracts, tenderer will be required to prepare the Eligibility and Qualification Criteria Form for each Lot.

40 Financial/ Economic Evaluation

40.1 To evaluate a Tender, the Procuring Entity shall consider the following:

a) price adjustment due to unconditional discounts offered in accordance with ITT 26.8; excluding provisional sums and contingencies, if any, but including Day work items, where priced competitively.

b) Price adjustment due to quantifiable nonmaterial non-conformities in accordance with ITT 31.3.

c) converting the amount resulting from applying (a) to (c) above, if relevant, to a single currency in accordance with ITT 33; and

d) the evaluation factors indicated in Section III, Evaluation and Qualification Criteria.

If price adjustment is allowed in accordance with ITT 17.9, the estimated effect of the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract, shall not be considered in Tender evaluation.

40.2 The Procuring Entity will evaluate and compare the Tenders that have been determined to be substantially responsive, pursuant to ITT 35.4. The evaluation will be performed assuming either that:

a) The Contract will be awarded to the Lowest Evaluated Tender for the entire Information System; or

b) if specified **in the TDS**, Contracts will be awarded to the Tenderers for each individual Subsystem, lot, or slice if so defined in the Technical Requirements whose Tenders result in the Lowest Evaluated Tender/ Tenders for the entire System.

In the latter case, discounts that are conditional on the award of more than one Subsystem, lot, or slice may be offered in Tenders. Such discounts will be considered in the evaluation of tenders as specified **in the TDS**.

41 Comparison of Tenders

41.1 The Procuring Entity shall compare all substantially responsive Tenders in accordance with ITT 35.6 to determine the lowest evaluated cost.

42 Abnormally Low Tenders and Abnormally High Tenders

42.1 An Abnormally Low Tender is one where the Tender price in combination with other constituent elements of the Tender appears unreasonably low to the extent that the Tender price raises material concerns as to the capability of the Tenderer to perform the Contract for the offered Tender Price or that genuine competition between Tenderers is compromised.

42.2 In the event of identification of a potentially Abnormally Low Tender, the Procuring Entity shall seek written clarifications from the Tenderer, including detailed price analyses of its Tender price in relation to the subject matter of the contract, scope, proposed methodology, schedule, allocation of risks and responsibilities and any other requirements of the tendering document.

42.3 After evaluation of the price analyses, in the event that the Procuring Entity determines that the Tenderer has failed to demonstrate its

capability to perform the Contract for the offered Tender Price, the Procuring Entity shall reject the Tender.

42.4 An abnormally high tender price is one where the tender price, in combination with other constituent elements of the Tender, appears unreasonably too high to the extent that the Procuring Entity is concerned that it (the Procuring Entity) may not be getting value for money, or it may be paying too high a price for the contract compared with market prices or that genuine competition between Tenderers is compromised.

42.5 In case of an abnormally high price, the Procuring Entity shall make a survey of the market prices, check if the estimated cost of the contract is correct and review the Tender Documents to check if the specifications, scope of work and conditions of contract are contributory to the abnormally high tenders. The Procuring Entity may also seek written clarification from the tenderer on the reason for the high tender price. The Procuring Entity shall proceed as follows:

a. If the tender price is abnormally high based on wrong estimated cost of the contract, the Procuring Entity may accept or not accept the tender depending on the Procuring Entity's budget considerations.

b. If specifications, scope of work and/ or conditions of contract are contributory to the abnormally high tender prices, the Procuring Entity shall reject all tenders and may retender for the contract based on revised estimates, specifications, scope of work and conditions of contract, as the case may be.

42.6 If the Procuring Entity determines that the Tender Price is abnormally too high because genuine competition between tenderers is compromised (*often due to collusion, corruption, or other manipulations*), the Procuring Entity shall reject all Tenders and shall institute or cause competent Government Agencies to institute an investigation on the cause of the compromise, before retendering.

43 Unbalanced or Front-Loaded Tenders

43.1 If the Tender that is evaluated as the lowest evaluated cost is, in the Procuring Entity's opinion, seriously unbalanced or front loaded the Procuring Entity may require the Tenderer to provide written clarifications. Clarifications may include detailed price analyses to demonstrate the consistency of the Tender prices with the scope of information systems, installations, proposed methodology, schedule and any other requirements of the tendering document.

43.2 After the evaluation of the information and detailed price analyses presented by the Tenderer, the Procuring Entity may: -

a) Accept the Tender; or

b) If appropriate, require that the total amount of the Performance Security be increased, at the expense of the Tenderer, to a level not exceeding twenty percent (20%) of the Contract Price; or

c) Reject the Tender.

44 Eligibility and Qualification of the Tenderer

44.1 The Procuring Entity shall determine to its satisfaction whether the Tenderer that is selected as having submitted the lowest evaluated and substantially responsive Tender is eligible and meets the qualifying criteria specified in Section III, Evaluation and Qualification Criteria.

44.2 The determination shall be based upon an examination of the documentary evidence of the Tenderer's qualifications submitted by the Tenderer, pursuant to ITT 15.

44.3 Unless otherwise specified in the **TDS,** the Procuring Entity will NOT carry out tests at the time of post- qualification, to determine that the performance or functionality of the Information System offered meets those stated in the Technical Requirements. However, if so specified in the **TDS** the Procuring Entity may carry out such tests as detailed in the **TDS**.

44.4 An affirmative determination shall be a prerequisite for award of the Contract to the Tenderer. A negative determination shall result in disqualification of the Tender, in which event the Procuring Entity shall proceed to the next lowest evaluated cost or best evaluated Tender, as the case may be, to make a similar determination of that

Tenderer's qualifications to perform satisfactorily.

44.5 The capabilities of the manufacturers and subcontractors proposed by the Tenderer that is determined to have offered the Best Evaluated Tender for identified major items of supply or services will also be evaluated for acceptability in accordance with Section III, Evaluation and Qualification Criteria. Their participation should be confirmed with a Form of intent between the parties, as needed. Should a manufacturer or subcontractor be determined to be unacceptable, the Tender will not be rejected, but the Tenderer will be required to substitute an acceptable manufacturer or subcontractor without any change to the Tender price. Prior to signing the Contract, the corresponding Appendix to the Contract Agreement shall be completed, listing the approved manufacturers or subcontractors for each item concerned.

44.6 Foreign tenderers are required to source at least forty (40%) percent of their contract inputs (in supplies, subcontracts and labor) from national suppliers and contractors. To this end, a foreign tenderer shall provide in its tender documentary evidence that this requirement is met. Foreign tenderers not meeting this criterion will be automatically disqualified. Information required to enable the Procuring Entity determine if this condition is met shall be provided in for this purpose is be provided in *"SECTIONIII- EVALUATION AND QUALIFICATION CRITERIA.*

45 Procuring Entity's Right to Accept Any Tender, and to Reject Any or All Tenders

45.1 The Procuring Entity reserves the right to accept or reject any Tender, and to annul the Tendering process and reject all Tenders at any time prior to contract award, without there by incurring any liability to Tenderers. In case of annulment, all Tenders submitted and specifically, Tender securities, shall be promptly returned to the Tenderers.

F. AWARD OF CONTRACT

46 Award Criteria

46.1 Subject to ITT 40, the Procuring Entity shall award the Contract to

the successful tenderer whose tender has been determined to be the Lowest/ best Evaluated Tender. The determination of the lowest/ Best Evaluated Tender will be made in accordance to one of the two options as defined in the **TDS**. The methodology options are:

The Procuring Entity shall award the Contract to the successful tenderer whose tender has been determined to be the Lowest Evaluated Tender

a) When **rated criteria are used**: The Tenderer that meets the qualification criteria and whose Tender:
   i) Is substantially responsive; and
   ii) Is the Best Evaluated Tender (i.e., the Tender with the highest combined technical/ quality/ price score); or
b) When **rated criteria are not used**: The Tenderer that meets the qualification criteria and whose Tender has been determined to be:
   i) Most responsive to the tendering document; and
   ii) The lowest evaluated cost.

47 Procuring Entity's Right to Vary Quantities at Time of Award

47.1 The Procuring Entity reserves the right at the time of Contract award to increase or decrease, by the percentage (s) for items as indicated **in the TDS.**

48 Notice of Intention to enter into a Contract/ Notification of award

48.1 Upon award of the contract and prior to the expiry of the Tender Validity Period the Procuring Entity shall issue a Notification of Intention to Enter into a Contract/ Notification of award to all tenderers which shall contain, at a minimum, the following information:

a) The name and address of the Tenderer submitting the successful tender;
b) The Contract price of the successful tender;
c) a statement of the reason(s) the tender of the unsuccessful tenderer to whom the letter is addressed was unsuccessful, unless

the price information in (c) above already reveals the reason;

d) the expiry date of the Standstill Period; and

e) instructions on how to request a debriefing and/ or submit a complaint during the standstill period;

49 Standstill Period

49.1 The Contract shall not be signed earlier than the expiry of a Standstill Period of 14 days to allow any dissatisfied tender to launch a complaint. Where only one Tender is submitted, the Standstill Period shall not apply.

49.2 Where a Standstill Period applies, it shall commence when the Procuring Entity has transmitted to each Tenderer the Notification of Intention to Enter into a Contract with the successful Tenderer.

50 Debriefing by the Procuring Entity

50.1 On receipt of the Procuring Entity's Notification of Intention to Enter into a Contract referred to in ITT 43, an unsuccessful tenderer may make a written request to the Procuring Entity for a debriefing on specific issues or concerns regarding their tender. The Procuring Entity shall provide the debriefing within five days of receipt of the request.

50.2 Debriefings of unsuccessful Tenderers may be done in writing or verbally. The Tenderer shall bear its own costs of attending such a debriefing meeting.

51 Letter of Award

51.1 Prior to the expiry of the Tender Validity Period and upon expiry of the Standstill Period specified in ITT44.1, upon addressing a complaint that has been filed within the Standstill Period, the Procuring Entity shall transmit the Letter of Award to the successful Tenderer. The letter of award shall request the successful tenderer to furnish the Performance Security within 21days of the date of the letter.

52 Signing of Contract

52.1 Upon the expiry of the fourteen days of the Notification of Intention to enter into contract and upon the parties meeting their respective statutory requirements, the Procuring Entity shall send the successful Tenderer the Contract Agreement.

52.2 Within fourteen (14) days of receipt of the Contract Agreement, the successful Tenderer shall sign, date, and return it to the Procuring Entity.

52.3 The written contract shall be entered into within the period specified in the notification of award and before expiry of the tender validity period.

52.4 Notwithstanding ITT 47.2 above, in case signing of the Contract Agreement is prevented by any export restrictions attributable to the Procuring Entity, to Kenya, or to the use of the Information System to be supplied, where such export restrictions arise from trade regulations from a country supplying those Information System, the Tenderer shall not be bound by its Tender, provided that the Tenderer can demonstrate that signing of the Contract Agreement has not been prevented by any lack of diligence on the part of the Tenderer in completing any formalities, including applying for permits, authorizations and licenses necessary for the export of the Information System under the terms of the Contract.

53 Performance Security

53.1 Within twenty-one (21) days of the receipt of the Form of Acceptance from the Procuring Entity, the successful Tenderer shall furnish the performance security in accordance with the General Conditions, subject to ITT38.2 (b), using for that purpose the Performance Security Form included in Section X, Contract Forms, or another form acceptable to the Procuring Entity. If the Performance Security furnished by the successful Tenderer is in the form of a bond, it shall be issued by a bonding or insurance company that has been determined by the successful Tenderer to be acceptable to the Procuring Entity. A foreign institution providing a Performance Security shall have a correspondent financial institution located in

Kenya.

53.2 Failure of the successful Tenderer to submit the above-mentioned Performance Security or sign the Contract shall constitute sufficient grounds for the annulment of the award and forfeiture of the Tender Security. In that event the Procuring Entity may award the Contract to the Tenderer offering the next Best Evaluated Tender.

54 Publication of Procurement Contract

Within fourteen days after signing the contract, the Procuring Entity shall publish the awarded contract at its notice boards and websites; and on the Website of the Authority. At the minimum, the notice shall contain the following information:

a) Name and address of the Procuring Entity;
b) Name and reference number of the contract being awarded, a summary of its scope and the selection method used;
c) The name of the successful Tenderer, the final total contract price, the contract duration.
d) Dates of signature, commencement and completion of contract;
e) Names of all Tenderers that submitted Tenders, and their Tender prices as read out at Tender opening.

55 Adjudicator

Unless **the TDS** states otherwise, the Procuring Entity proposes that the person named **in the TDS** be appointed as Adjudicator under the Contract to assume the role of informal Contract dispute mediator, as described in GCC Clause 43.1. In this case, a résumé of the named person is attached to the TDS. The proposed hourly fee for the Adjudicator is specified in the TDS. The expenses that would be considered reimbursable to the Adjudicator are also specified **in the TDS**. If a Tenderer does not accept the Adjudicator proposed by the Procuring Entity, it should state its non-acceptance in its Tender Form and make a counter proposal of an Adjudicator and an hourly fee, attaching résumé of the alternative. If the successful Tenderer and the Adjudicator nominated **in the TDS** happen to be from the same country, and this is not Kenya too, the Procuring Entity reserves the right to cancel the Adjudicator nominated **in the TDS** and propose a

new one. If by the day the Contract is signed, the Procuring Entity and the successful Tenderer have not agreed on the appointment of the Adjudicator, the Adjudicator shall be appointed, at the request of either party, by the Appointing Authority specified in the SCC clause relating to GCC Clause 43.1.4, or if no Appointing Authority is specified there, the Contract will be implemented without an Adjudicator.

56 Procurement Related Complaints and Administrative Review

56.1 The procedures for making a Procurement-related Complaint are as specified in the **TDS.**

56.2 A request for administrative review shall be made in the form provided under contract forms.

SECTION II – TENDER DATA SHEET (TDS)

The following specific data shall complement, supplement, or amend the provisions in the Instructions to Tenderers (ITT). Whenever there is a conflict, the provisions herein shall prevail over those in ITT.

ITT Reference	A. General
ITT 1.1	**KPC/PU/OT-038/I&C/NBI/21-22** **Kenya Pipeline Company Limited** Tenders for Design, Supply, Installation, Configuration, Testing and Commissioning of SCADA System Upgrade.
ITT 2.3 (a)	**Electronic – Procurement System** The Procuring Entity shall use the following electronic-procurement system to manage this Tendering process: SRM: **https://e-procurement.kpc.co.ke/irj/portal**
ITT 3.3	The firms (if any) that provided consulting services for the contract being tendered for are **NOT APPLICABLE**
ITT 4.1	Maximum number of members in the Joint Venture (JV) shall be **Three (3)**
ITT 4.8	Tenderers shall be required to be registered with opentender@kpc.co.ke
	B. Contents of Tendering Document
ITT 8.1	A pre-Tender meeting will be held on **NOT APPLICABLE** Site visit is scheduled for **10.00am** on **27th October 2021** at Nairobi Terminal (PS10).
ITT 8.2	The tenderer will submit any questions in writing to reach procuring entity not later than 2 days before the meeting to opentender@kpc.co.ke and on the SRM portal - **NOT APPLICABLE**
ITT 8.4	The minutes of the pre-Tender meeting shall be published on the website www.kpc.co.ke – **NOT APPLICABLE**

ITT 9.1	For **Clarification of Tender purposes** only, the Procuring Entity's address is: Kenya Pipeline Company Limited P. O BOX 73422 – 00200 NAIROBI Tel: 020 260 6500 – 4, 0720207678/79/81 0709723004/6 Electronic mail address: opentender@kpc.co.ke Requests for clarification should be received by the Procuring Entity no later than **Seven (7)** days before closing date. Web page: ***www.kpc.co.ke***
	C. Preparation of Tenders
ITT 13.1 (k)	The Tenderer shall submit the following additional documents in its Tender: **a) Provide a Certificate of Incorporation/Registration** **b) Provide a Tender Security of USD20,000.00 issued by a reputable bank /insurance company approved by The Public Procurement Oversight Authority of Kenya (PPOA) valid for 212 days from date of opening.** **c) Provide a certificate of site visit. Site visit is scheduled for 10.00am, 27th October 2021 at Nairobi Terminal (PS10).** **d) Submission of a signed commitment by SCADA manufacturer to support integration of LDS and SCADA System.** **e) Bidder be Manufacturer of own SCADA system renown and tested specifically for oil and gas application with demonstration of existence of SCADA software solutions in Oil and Gas pipelines for the last 15 years by providing at least FIVE completion certificates in oil and gas cross-country pipeline of at least 400km long.** **f) Duly signed self-declaration Forms (Forms SD1, SD2 and Declaration and commitment to the code of Ethics):** • **Form SD1 - Self Declaration That the Person/ Tenderer Is Not Debarred in The Matter of The Public**

	Procurement and Asset Disposal Act 2015. • **Form SD2 - Self Declaration That the Person/ Tenderer will Not Engage in Any Corrupt or Fraudulent Practice** • **Declaration and Commitment to The Code of Ethics**
ITT 15.1	Alternative Tenders **shall not** be permitted
ITT 17.2	Prequalification ***"has not"*** been undertaken.
ITT 18.2 (a)	In addition to the topics described in ITT Clause 18.2 (a), the Preliminary Project Plan must address the following topics: (i) ***Project Organization and Management Sub-Plan, including management authorities, responsibilities, and contacts, as well as task, time and resource-bound schedules (in GANTT format);*** (ii) ***Implementation plan;*** (iii)***Training Plan;*** (iv)***Testing and Quality Assurance Plan;*** (v) ***Warranty Defect Repair and Technical Support Service Sub-Plan***
ITT 18.3	In the interest of effective integration, cost-effective technical support, and reduced re-training and staffing costs, Tenderers are required to offer specific brand names and models for the following limited number of specific items: All Items in the tender technical specifications. ***AS PER SCADA TECHNICAL REQUIREMENTS***
ITT 19.2	The Tenderer ***must not*** tender Recurrent Cost Items
ITT 19.5	The Incoterms edition is ***INCOTERMS 2021***
ITT 19.5 (a)	Named place of destination is: *To **KPC Sites as described** in tender document*
ITT 19.6	Named place of final destination (or Project site) is: ***KPC Sites as described*** *in tender document*.
ITT 19.8	*There is no modification to ITT 17.8*
ITT 19.9	The prices quoted by the Tenderer ***shall not*** be subject to adjustment during the performance of the Contract.
ITT 20.1	The Tenderer ***is*** required to quote in the **US Dollar**.
ITT 21.1	The Tender validity period shall be 182 days.

ITT 22.1	**Original Tender Security of USD.20,000.00 from a bank or an Insurance Company Approved by PPRA. The Tender Security shall remain valid for 212 days from the date of tender opening.** Bidders must submit a scanned copy of the tender security with their bid document. The ORIGINAL Tender Security must then be dropped in the tender box on ground floor,Kenpipe plaza, Sekondi road off Nanyuki road on **3rd November 2021** at **10.00am**
ITT 22.3 (e)	Other types of acceptable securities are - **NOT APPLICABLE**
ITT 23.1	In addition to the original of the Tender, the number of copies *is:* **NOT APPLICABLE**. *This is an E-procurement.*
ITT 23.3	The written confirmation of authorization to sign on behalf of the Tenderer shall consist of *Power of Attorney*
D.	**Submission and Opening of Tenders**
ITT 24	(A) For Tender submission purposes only, the Procuring Entity's address is: Kenya Pipeline Company Limited Completed tender documents must be submitted electronically in PDF format and uploaded on the Supplier Relationship Management (SRM) Collaboration Folder, Using the link https://e-procurement.kpc.co.ke/irj/portal **Hard copies of tender documents shall not be accepted**. **For Tender Security only** Bidders must submit a Scanned copy of the tender security with their bid document. The ORIGINAL Tender Security must then be dropped in the tender box on ground floor, Kenpipe plaza, Sekondi road off Nanyuki road, Industrial Area, Nairobi on **3rd November 2021** at **10.00am.** **NB:- Only the Tender Security shall be dropped in the Tender**

	Box Date and time for submission of Tenders **3rd November 2021** at **10.00am.** Tenders shall be submitted electronically only.
ITT 25.1	If Tenderers are allowed to submit Tenders electronically, they shall follow the electronic tender submission procedures **specified below:** Completed tenders must be submitted electronically in PDF format and uploaded on the Supplier Relationship Management (SRM) Collaboration Folder, Using the link https://e-procurement.kpc.co.ke/irj/portal. Hard copies of tender documents will not be permitted. Instruction manual for supplier registration and the bidding processes are available on the KPC website (www.kpc.co.ke)
ITT 28.1	The Tender opening shall take place virtually using the following link :https://forms.office.com/r/Z8BFkEjM66 **Date: 3rd November 2021** **Time: 10.30 a.m.**
ITT 28.7	The Form of Tender and Price Schedules shall be initialed by at ***least 3*** *r*epresentatives of the Procuring Entity conducting Tender opening.
	Evaluation, and Comparison of Tenders
ITT 33.3	Provided that a Tender is substantially responsive, the Procuring Entity shall rectify quantifiable nonmaterial non-conformities related to the Tender Price. To this effect, the Tender Price shall be adjusted, for comparison purposes only, to reflect the price of a missing or non-conforming item or component in the manner specified **in the TDS**. **NOT APPLICABLE**
ITT 35.1	The currency(ies) of the Tender shall be converted into a single currency as follows: **NOT APPLICABLE**

ITT 36.2	Margin of Preference **shall not apply.**
ITT 36.4	The invitation to tender is extended to the following group that qualify for Reservations – **NOT APPLICABLE**
ITT 40.2 (b)	Contracts will be awarded to the Tenderers for each individual Subsystem, lot, or slice if so defined in the Technical Requirements whose Tenders result in the Lowest Evaluated Tender/ Tenders for the entire System – **NOT APPLICABLE**
ITT 44.3	As additional qualification measures, the Information System (or components/parts of it) offered by the Tenderer with the Best Evaluated Tender may be subjected to the following tests and performance benchmarks prior to Contract award*:* ***NOT APPLICABLE***
ITT 46.1 (a)	When **rated criteria are used**: The Tenderer that meets the qualification criteria and whose Tender: i) Is substantially responsive; and ii) Is the Best Evaluated Tender (i.e., the Tender with the highest combined technical/ quality/ price score) ***APPLICABLE***
ITT 47.1	The Procuring Entity reserves the right at the time of Contract award to increase or decrease, by the percentage (s) for items as indicated **in the TDS – *NOT APPLICABLE***
ITT 55	There will be no Adjudicator under this Contract.
ITT 56.1	The procedures for making a Procurement-related Complaint are detailed in the "Notice of Intention to Award the Contract" herein and are also available from the PPRA website info@ppra.go.ke or complaints@ppra.go.ke. If a Tenderer wishes to make a Procurement-related Complaint, the Tenderer should submit its complaint following these procedures, in writing (by the quickest means available, that is either by email or fax), to: **For the attention**: **General Manager (Supply Chain)** **Kenya Pipeline Company Limited** **P.O.Box 73442-00200** **Nairobi**

	Email: gmsc@kpc.co.ke *Or* **Director General** **Public Procurement Regulatory Authority** **P. O. Box 58535-00200** **Nairobi** **Email: complaints@ppra.go.ke** In summary, a Procurement-related Complaint may challenge any of the following: 1. the terms of the Tendering Documents; and 2. the Procuring Entity's decision to award the contract.

SECTION III - EVALUATION AND QUALIFICATION CRITERIA

1. General Provision

1.1 Wherever a Tenderer is required to state a monetary amount, Tenderers should indicate the Kenya Shilling equivalent using the rate of exchange determined as follows:

a) For construction turnover or financial data required for each year- Exchange rate prevailing on the last day of the respective calendar year (in which the amounts for that year are to be converted) was originally established.

b) Value of single contract- Exchange rate prevailing on the date of the contract signature.

c) Exchange rates shall be taken from the publicly available source identified in the ITT. Any error in determining the exchange rates in the Tender may be corrected by the Procuring Entity.

1.2 This Section contains all the criteria that the Procuring Entity shall use to evaluate Tenders and qualify Tenderers. No other factors, methods or criteria shall be used. The Tenderer shall provide all the information requested in the forms included in Section IV, Tendering Forms. The Procuring Entity shall use **the Standard Tender Evaluation Report for Goods and Works** for evaluating Tenders.

2. Evaluation and contract award Criteria

The Procuring Entity shall use the criteria and methodologies listed in this Section to evaluate tenders and arrive at the Lowest Evaluated Tender. The tender that:

(i) meets the qualification criteria,
(ii) has been determined to be substantially responsive to the Tender Documents, and
(iii) is determined to have the Lowest Evaluated Tender price shall be selected for award of contract.

3. Preliminary examination for Determination of Responsiveness

The Procuring Entity will start by examining all tenders to ensure they meet in all respects the eligibility criteria and other mandatory requirements in

the ITT, and that the tender is complete in all aspects in meeting the requirements provided for in the preliminary evaluation criteria outlined below. The Standard Tender Evaluation Report Document for Goods and Works for evaluating Tenders provides very clear guide on how to deal with review of these requirements. Tenders that do not pass the Preliminary Examination will be considered non- responsive and will not be considered further.

1. <u>Preliminary Evaluation for Lead Bidder</u>

Interested firms **must** ensure that they comply with the following requirements and submit the relevant documents, failure to which the tenderer will be disqualified from further evaluation:

a. **Provide a Certificate of Incorporation/Registration**
b. **Provide a Tender Security of USD20,000.00 issued by a reputable bank /insurance company approved by The Public Procurement Oversight Authority of Kenya (PPOA) valid for 212 days from date of opening.**
c. **Provide a certificate of site visit. Site visit is scheduled for 10.00am, 27th October 2021 at Nairobi Terminal (PS10).**
d. **Submission of a signed commitment by SCADA manufacturer to support integration of LDS and SCADA System.**
e. **Bidder be Manufacturer of own SCADA system renown and tested specifically for oil and gas application with demonstration of existence of SCADA software solutions in Oil and Gas pipelines for the last 15 years by providing at least FIVE completion certificates in oil and gas cross-country pipeline of at least 400km long.**
f. **Duly signed self-declaration Forms (Forms SD1, SD2 and Declaration and commitment to the code of Ethics):**
    - **Form SD1 - Self Declaration That the Person/ Tenderer Is Not Debarred in The Matter of The Public Procurement and Asset Disposal Act 2015.**
    - **Form SD2 - Self Declaration That the Person/ Tenderer will Not Engage in Any Corrupt or Fraudulent Practice**
    - **Declaration and Commitment to The Code of Ethics**

2. <u>Preliminary Evaluation for Local Partner (Kenyan Citizen) Firms additional requirements</u>

The local firms (Kenyan citizen firms) participating in this tender shall meet the following criteria in addition to the mandatory requirements in invitation of tender: (where Applicable)

a) **Submit Copy of Certificate of Incorporation/Registration**
b) **Provide a Valid KRA Tax Compliance Certificate.**
c) **Provide a certificate of site visit. Site visit is scheduled for 10.00am, 27th October 2021 at Nairobi Terminal (PS10).**
d) **Duly signed self-declaration Forms (Forms SD1, SD2 and Declaration and commitment to the code of Ethics):**
    i. **Form SD1 - Self Declaration That the Person/ Tenderer Is Not Debarred in The Matter of The Public Procurement and Asset Disposal Act 2015.**
    ii. **Form SD2 - Self Declaration That the Person/ Tenderer will Not Engage in Any Corrupt or Fraudulent Practice**
    iii. **Declaration and Commitment to The Code of Ethics**

Notes:

1. KPC reserves the right to confirm the authenticity of all documents submitted by tenderers, and therefore, **may carry due diligence in whole or part** of information presented with or without knowledge of tenderer. Any attempt by bidders to misrepresent themselves by submitting documents that are not genuine will amount to automatic disqualification.

2. Prices quoted should be net inclusive of all taxes and shall remain valid for a period of **182 days** from the opening date.

3. Latest versions of systems in this tender specification shall be supplied.

TECHNICAL EVALUATION

KPC will carry out technical evaluations of the bids, which shall be scored based on the evaluation criteria given below and fulfilment of technical specifications of the systems.

Bidders are therefore requested to carefully read the tender requirements and

furnish authentic and complete information in response.

KPC may to carry due diligence on whole or part of information submitted without reference to bidder. Any misrepresentation of facts will not only lead to automatic DISQUALIFICATION, but also DEBARMENT of bidder from KPC's future tenders.

No.	Description of criteria	Max Points	Bidder Score	Comments
1.	**Conformity to Technical Specifications**	**50**		
1.1.	**Proposed Architecture:** A bidder who submits a comprehensive Proposed Architecture, meeting KPC stated requirements as a minimum - Proposal of detailed system covering KPC pipelines pump stations and depots. - Proposal detailing redundancy and communication network architecture including network security features. - SCADA software capability: 1 million tags supported, with a minimum of 200,000 being analog. - Demonstration of SCADA proposal with alarm management system as per KPC specifications - Demonstration of SCADA proposal with Data backfilling as per KPC specifications. (**2 mark each**)	10		
1.2.	**Integration Requirements:** A bidder who submits an integration requirement showing the following details: - Standard industry communication protocols with which the system is compatible including Modbus (Serial & TCPIP), OPC, DNP3, IEC 60870,	15		

	Profibus protocols at minimum. The protocols shall be selectable from a drop-down list in software. - ATG integration details - Flow/provers computers integration details. - Proposal showing mobility integration with appropriate mobile apps. - Proposal demonstrating integrability with SAP system with no hitches (**4 marks**). - Cotas (HMS) system integration details with no hitches. - Integration of Fire Alarming system - Cathodic Protection Stations integration - UPS systems Integration - ESD systems integration - Line5 Delta V integration, - Integration with the PLC/RTUs (**1 marks each unless indicated**)			
1.3.	**Preliminary Engineering Design proposal:** System Proposal with technical specifications that contain at least: - Product and subsystems data sheets, - System layouts, - System redundancies, - Required servers, - Realtime Servers polling speed, - Workstation hardware specifications, - Network switches, firewalls, and routers, - Control room furniture features, - Liquid management system (tanking, central metering, loss/gain, ticket management, pumpover management, ESD, AutoStart/stop, auto prove, meter factor MF management, line pack,	25		

	scheduling, batch tracking, etc.) – **5marks** - Pipeline optimizer, - Energy management proposal, - UPS proposal – **3marks** - Operator workstation features, - Pipeline trainer system, - Reporting suites and data mining tools, - Tag depository and editing tools, - System configuration templates, - Graphic development tools, - Database management etc. (**1 marks each unless indicated**)			
1.4.	**Pump Stations and Terminal Management System for KPC Depots** i. Backfilling server solution for presets (Acculoads), ATG, Flow computers. (**2marks**) ii. Backfilling configurations proposal for all pump stations**. (1mark)**	3		
1.5.	**Warranty and After Sales Service** Bidders should provide warranties on all equipment as specified in the tender document. Bidder who provides warranties for twenty-four (24) months or longer after commissioning for SCADA systems as well as after sales SCADA system maintenance proposal will be awarded **4points**. Otherwise, **0points**	4		
1.6.	**System migration and cutover procedure** - Proposal with comprehensive methodology on migration and cutover plan covering historical information, power supplies, Realtime configurations, Domain controller data and engineering	10		

	server data into proposed system without loss of such data.			
1.7.	**Factory Acceptance Test Proposal** Bidders should provide a comprehensive Factory Acceptance Test proposal for KPC staff as described in this tender document. The points shall be awarded as follows: A bidder who provides a comprehensive Factory Acceptance Test proposal as per KPC's requirements **3marks, otherwise 0marks**.	3		
2.	**Local Partner Past Experience**	4		
	Local partner with experience in electrical or instrumentation related works. Local partner to provide Certified copy of National Construction Authority certificate for Electrical Works (at least NCA1) as a mandatory, failure to with will attract **0marks** in this section. Submit two completion certificates or reference letters on client letterhead (**2marks each**)			
3.	**Qualifications of Key Personnel for Commissioning of SCADA Systems**	10		
	Bidders should submit comprehensive CVs of all their key technical project personnel as a minimum: Project Manager (**4marks**), Project Engineers (**4marks**), Project System analysts (**2marks**). Their academic qualifications, training and relevant experience, minimum of five (5) years, and professional certification. Should demonstrate their expertise in the relevant engineering disciplines and capability to perform the tasks, must have at least 5 years			

	of experience in oil and gas SCADA system projects management. The points shall be awarded as follows: A bidder who complies with the above requirements will be considered complied with requirements. Otherwise, will be considered non complied.			
4.	**Firm's Experience on similar Works**	3		
	• 5 projects of 400km each in last 15 years • Evidence of deployment of similar system on Pipe size of 14inch and above • Signed completion certificate evidence of SCADA system installations in an oil and gas industry.			
5.	**Firm's Financial capability**	3		
	Submission of audited accounts for last three years with a combined turnover of at least $100,000,000			
6.	**Training and System Development Proposal**	5		
	Bidders should provide a comprehensive SCADA system training and development proposal as described in this tender document. The points shall be awarded as follows: i. Comprehensive technical and Maintenance training program. ii. Proposal to involve KPC staff in system development as described in tender specifications. iii. Provide evidence of qualified trainers (in form of certified certificates and training experience).			
7.	**Comprehensive Project Plan and QC/QA plan adequacy and methodology**	5		
	i. Responsibilities Matrix – outlining the roles and functions.			

	ii. Test plans and requirements. iii. Resource Requirements – showing the utilization of project resources. iv. Work Schedules – giving description and timelines of each activity. v. Job Safety Analysis – detailing potential hazards and their mitigation. (**1 marks each unless indicated**)			
8.	**Total Points**	**100**		

Tenders must score at least 85% overall and 50% in each category in order to proceed to financial evaluation.

Tenderers who do not comply with any one requirement will be automatically disqualified. Tenderers who pass the technical evaluation will be evaluated further.

FINANCIAL EVALUATION

Name of Tenderer _____ Tender Number_____

The Evaluation shall be carried out on bidder's Financial Submission to determine that bidder:

1. Has quoted for all materials, unit price, currency, quantities and totals required for SCADA upgrade.
2. Has Duly filled Form of tender.

Bidder who does not meet above or comply with requirements of tender shall be disqualified from further evaluation.

Award shall be based on lowest responsive bid.

4. Post qualification and Contract ward (ITT 39)

The post qualification criteria shall be

a) History of non-performing contracts:
Tenderer and each member of JV in case the Tenderer is a JV, shall demonstrate that Non-performance of a contract did not occur because

of the default of the Tenderer, or the member of a JV in the last 5 years (2015 to present). The required information shall be furnished in the appropriate form.

b) Pending Litigation

Tenderer shall provide information on pending litigations in the appropriate form.

c) Litigation History

There shall be no consistent history of court/arbitral award decisions against the Tenderer, in the last 5 years (2015 to present). All parties to the contract shall furnish the information in the appropriate form about any litigation or arbitration resulting from contracts completed or on going under its execution over the years specified. A consistent history of awards against the Tenderer or any member of a JV may result in rejection of the tender.

5. QUALIFICATION FORM

Item No.	*Qualification Subject*	*Qualification Requirement to be met*	*Document To be Completed by Tenderer*	*For Procuring Entity's Use (Qualification met or Not Met)*
1	2.1.1 Nationality	Nationality in accordance with ITT 4.5.	Form ELI –2.1.1 and 2.1.2, with attachments	
2	Tax Obligations for Kenyan Tenderers	Has produced a current tax clearance certificate or tax exemption certificate issued by the Kenya Revenue Authority in accordance with ITT 3.14.	Form of Tender	
3	2.1.2 Conflict of Interest	No- conflicts of interests as described in ITT 4.3.	Form of Tender	
4	2.1.3 Country Ineligibility	Not having been declared ineligible by the PPRA as described in ITT 4.6.	Form of Tender	
5	2.1.4 State owned Entity of the Procuring Entity country	Compliance with conditions of ITT 4.7	Form ELI –2.1.1 and 2.1.2, with attachments	
6	2.1.5 United Nations resolution or Kenya law	Not having been excluded as a result of prohibition in Kenya laws or official regulations against commercial relations with the Tenderer's country, or by an act of compliance with UN	Form of Tender	

Item No.	*Qualification Subject*	*Qualification Requirement to be met*	*Document To be Completed by Tenderer*	*For Procuring Entity's Use (Qualification met or Not Met)*
		Security Council resolution, both in accordance with ITT 4.8		
7	History of non-performing contracts	Non-performance of a contract[1] did not occur as a result of Tenderer's default since 1st January 2015.	Form CON - 2	
8	Suspension	Not under suspension based on execution of a Tender Securing Declaration or Tender Securing Declaration pursuant to ITT 4.8 and ITT 20.10	Form of Tender	
9	Pending Litigation	Tenderer's financial position and prospective long-term profitability still sound according to criteria established in 2.3.1 below and assuming that all pending litigation will be resolved against the Tenderer.	Form CON – 2	
10	2.3.1 Historical Financial Performance	Submission of audited balance sheets or if not required by the law of the Tenderer's country, other financial statements acceptable to the Procuring Entity, for the last __3__ [three] years to demonstrate the current soundness of the Tenderers financial position and its prospective long-term profitability.	Form FIN – 2.3.1 with attachments	
11	2.3.2 Average	Minimum average annual turnover of $30,000,000 (US	Form FIN –2.3.2	

[1] Nonperformance, as decided by the Procuring Entity, shall include all contracts where (a) nonperformance was not challenged by the contractor, including through referral to the dispute resolution mechanism under the respective contract, and (b) contracts that were so challenged but fully settled against the contractor. Nonperformance shall not include contracts where Procuring Entity decision was overruled by the dispute resolution mechanism. Nonperformance must be based on all information on fully settled disputes or litigation, i.e., dispute or litigation that has been resolved in accordance with the dispute resolution mechanism under the respective contract and where all appeal instances available to the applicant have been exhausted.

Item No.	*Qualification Subject*	*Qualification Requirement to be met*	*Document To be Completed by Tenderer*	*For Procuring Entity's Use (Qualification met or Not Met)*
	Annual Turnover	Dollar) or equivalent, calculated as total certified payments received for contracts in progress or completed, within the last__3____ (three) years		
12	2.3.3 Financial Resources	The Tenderer must demonstrate access to, or availability of, financial resources such as liquid assets, unencumbered real assets, lines of credit, and other financial means, other than any contractual advance payments to meet the following cash-flow requirement: Minimum of $100,000,000 (US Dollar) or equivalent.	Form FIN –2.3.3	
13	2.4.1 General Experience	Experience under SCADA System in the role of prime supplier, management contractor, JV member, or subcontractor for at least the last 10 years prior to the applications submission deadline.	Form EXP-2.4.1	Refer to evaluation criteria tech
	2.4.2 Specific Experience	Participation as a prime supplier, management contractor, JV member, sub-contractor, in at least 5 (five) contracts within the last 15 (fifteen) years, each with a value of at least $5,000,000 (five million US Dollar), that have been successfully and substantially completed and that are similar to the proposed SCADA Upgrade.	Form EXP 2.4.2	

6. Personnel

The Tenderer must demonstrate that will have the personnel for the key positions that meet the following requirements:

No.	Position	Information System Experience
1	Project Manager	Minimum 5years of Experience in SCADA System projects
2	Project Engineers	Minimum 4years of Experience in SCADA System development and installation
3	System Analyst	Minimum 5years of Experience in SCADA System development

The Tenderer shall provide details of the proposed personnel relevant qualifications and their experience records in the relevant Forms included in Section IV, Tendering Forms.

7. Subcontractors/vendors/manufacturers

Subcontractors/vendors/manufacturers for the following major items of supply or services must meet the following minimum criteria, herein listed for that item:

Item No.	Description of Item	Minimum Criteria to be met
1		
2		
3		
…		

Failure to comply with this requirement will result in rejection of the subcontractor/vendor.

In the case of a Tenderer who offers to supply and install major items of supply under the contract that the Tenderer did not manufacture or otherwise produce, the Tenderer shall provide the manufacturer's authorization, using the form provided in Section IV, showing that the

Tenderer has been duly authorized by the manufacturer or producer of the related sub system or component to supply and install that item in Kenya. The Tenderer is responsible for ensuring that the manufacturer or producer complies with the requirements of ITT 4 and 5 and meets the minimum criteria listed above for that item.

SECTION IV - TENDERING FORMS

1. FORM OF TENDER

INSTRUCTIONS TO TENDERERS

i) The Tenderer must prepare this Form of Tender on stationery with its letter head clearly showing the Tenderer's complete name and business address.

ii) All italicized text is to help Tenderer in preparing this form.

iii) Tenderer must complete and sign TENDERER'S ELIGIBILITY-CONFIDENTIAL BUSINESS QUESTIONNAIRE, CERTIFICATE OF INDEPENDENT TENDER DETERMINATION and the SELF DECLARATION OF THE TENDERER, all attached to this Form of Tender

iv) The Form of Tender shall include the following Forms duly completed and signed by the Tenderer.

- *Tenderer's Eligibility-Confidential Business Questionnaire*
- *Certificate of Independent Tender Determination*
- *Self-Declaration of the Tenderer*

Date of this Tender submission..... [*insert date (as day, month and year) of Tender submission*] **ITT No.:** ..... [*insert number of ITT process*]

To: ..... **[*insert complete name of Procuring Entity]***

a) **No reservations:** We have examined and have no reservations to the tendering document, including Addenda issued in accordance with Instructions to Tenderers (ITT 8);

b) **Eligibility**: We meet the eligibility requirements and have no conflict of interest in accordance with ITT 4;

c) **Tender-Securing Declaration:** We have not been debarred by the Authority based on execution of a Tender- Securing Declaration or Tender Securing Declaration in Kenya in accordance with ITT 4.8;

d) **Conformity:** We offer to provide design, supply and installation services

in conformity with the tendering document of the following: [*insert a brief description of the IS Design, Supply and Installation Services*];

e) **Tender Price:** The total price of our Tender, excluding any discounts offered in item (f) below is: *[Insert one of the options below as appropriate]*

[Option1, in case of one lot:] Total price is: [*insert the total price of the Tender in words and figures, indicating the various amounts and the respective currencies*];

Or

[Option 2, in case of multiple lots:] (a) Total price of each lot [*insert the total price of each lot in words and figures, indicating the various amounts and the respective currencies*]; and (b) Total price of all lots (sum of all lots) [*insert the total price of all lots in words and figures, indicating the various amounts and the respective currencies*];

f) **Discounts:** The discounts offered and the methodology for their application are:

i) The discounts offered are: [*Specify in detail each discount offered.*]

ii) The exact method of calculations to determine the net price after application of discounts is shown below: [*Specify in detail the method that shall be used to apply the discounts*];

g) **Tender Validity Period:** Our Tender shall be valid for the period specified in TDS ITT 19.1 (as amended if applicable) from the date fixed for the Tender submission deadline (specified in TDS ITT 23.1 (as amended if applicable), and it shall remain binding upon us and may be accepted at any time before the expiration of that period;

h) **Performance Security:** If our Tender is accepted, we commit to obtain a Performance Security in accordance with the tendering document;

i) **One Tender per Tenderer:** We are not submitting any other Tender (s) as an individual Tenderer, and we are not participating in any other Tender (s) as a Joint Venture member, and meet the requirements of ITT 4.3, other than alternative Tenders submitted in accordance with ITT 13;

j) **Suspension and Debarment**: We, along with any of our subcontractors, suppliers, consultants, manufacturers, or service providers for any part of

the contract, are not subject to, and not controlled by any entity or individual that is subject to, a temporary suspension or a debarment imposed by the PPRA. Further, we are not in eligible under Laws of Kenya or official regulations or pursuant to a decision of the United Nations Security Council;

k) **State-owned enterprise or institution**: [*select the appropriate option and delete the other*] [*We are not a state- owned enterprise or institution*]/ [*We are a state-owned enterprise or institution but meet the requirements of ITT 4.7*];

l) **Commissions, gratuities, and fees**: We have paid, or will pay the following commissions, gratuities, or fees with respect to the Tendering process or execution of the Contract: *[insert complete name of each Recipient, its full address, the reason for which each commission or gratuity was paid and the amount and currency of each such commission or gratuity]*

Name of Recipient	**Address**	**Reason**	**Amount**

(If none has been paid or is to be paid, indicate "none.")

m) **Binding Contract**: We understand that this Tender, together with your written acceptance thereof included in your Form of Acceptance, shall constitute a binding contract between us, until a formal contract is prepared and executed;

n) **Not Bound to Accept:** We understand that you are not bound to accept the lowest evaluated cost Tender, the Best Evaluated Tender or any other Tender that you may receive; and

o) **Fraud and Corruption:** We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf engages in any type of Fraud and Corruption.

Name of the Tenderer: *[*insert complete name of person signing the*

Tender]

p) **Collusive practices:** We hereby certify and confirm that the tender is genuine, non-collusive and made with the intention of accepting the contract if awarded. To this effect we have signed the "Certificate of Independent Tender Determination" attached below.

q) **Code of Ethical Conduct:** We undertake to adhere by the Code of Ethical Conduct for Persons Participating in Public Procurement and Asset Disposal Activities in Kenya, copy available from ***www.pppra.go.ke*** during the procurement process and the execution of any resulting contract.

r) We, the Tenderer, have fully completed and signed the following Forms as part of our Tender:

i) Tenderer's Eligibility; Confidential Business Questionnaire – to establish we are not in any conflict to interest.

ii) Certificate of Independent Tender Determination – to declare that we completed the tender without colluding with other tenderers.

iii) Self-Declaration of the Tenderer–to declare that we will, if awarded a contract, not engage in any form of fraud and corruption.

iv) Declaration and commitment to the code of ethics for Persons Participating in Public Procurement and Asset Disposal Activities in Kenya. Further, we confirm that we have read and understood the full content and scope of fraud and corruption as in formed in **"Appendix1-Fraud and Corruption**" attached to the Form of Tender.

Name of the person duly authorized to sign the Tender on behalf of the Tenderer: **[*insert complete name of person duly authorized to sign the Tender*]

Title of the person signing the Tender: [*insert complete title of the person signing the Tender*] **Signature of the person named above**: [*insert signature of person whose name and capacity are shown above*] **Date signed** [*insert date of signing*] **day of** [*insert month*], [*insert year*].

2. TENDERER'S ELIGIBILITY-CONFIDENTIAL BUSINESS QUESTIONNAIRE

Instruction to Tenderer

Tender is instructed to complete the particulars required in this Form, *one form for each entity if Tender is a JV.* Tenderer is further reminded that it is an offence to give false information on this Form.

a) Tenderer's details

	ITEM	**DESCRIPTION**
1	Name of the Procuring Entity	KENYA PIPELINE COMPANY LIMITED
2	Reference Number of the Tender	KPC/PU-
3	Date and Time of Tender Opening	
4	Name of the Tenderer	
5	Full Address and Contact Details of the Tenderer.	1. Country 2. City 3. Location 4. Building 5. Floor 6. Postal Address 7. Name and email of contact person.
6	Current Trade License Registration Number and Expiring date	
7	Name, country, and full address (*postal and physical addresses, email, and telephone number*) of Registering Body/Agency	
8	Description of Nature of Business	
9	Maximum value of business which the Tenderer handles.	
10	State if Tenders Company is listed in stock exchange, give name and full address (*postal and physical addresses, email, and telephone*	

	ITEM	DESCRIPTION
	number) of state which stock exchange	

General and Specific Details

b) **Sole Proprietor,** provide the following details.

Name in full

Age

Nationality_____

Country of Origin

Citizenship _____

c) **Partnership,** provide the following details.

	Names of Partners	Nationality	Citizenship	% Shares owned
1				
2				
3				

d) **Registered Company,** provide the following details.

(i) Private or public Company

(ii) State the nominal and issued capital of the Company

Nominal Kenya Shillings (Equivalent).....
.....

Issued Kenya Shillings (Equivalent).....
.....

(iii) Give details of Directors as follows.

	Names of Director	Nationality	Citizenship	% Shares owned
1				
2				
3				

e) **DISCLOSURE OF INTEREST** - Interest of the Firm in the Procuring Entity.

i) are there any person/persons in…… (*Name of Procuring Entity)* who has/have an interest or relationship in this firm? Yes/ No……

If yes, provide details as follows.

	Names of Person	Designation in the Procuring Entity	Interest or Relationship with Tenderer
1			
2			
3			

ii) Conflict of interest disclosure

	Type of Conflict	Disclosure YES OR NO	If YES provide details of the relationship with Tenderer
1	Tenderer is directly or indirectly controls, is controlled by or is under common control with another tenderer.		
2	Tenderer receives or has received any direct or indirect subsidy from another tenderer.		
3	Tenderer has the same legal representative as another tenderer		
4	Tender has a relationship with		

	Type of Conflict	Disclosure YES OR NO	If YES provide details of the relationship with Tenderer
	another tenderer, directly or through common third parties, that puts it in a position to influence the tender of another tenderer or influence the decisions of the Procuring Entity regarding this tendering process.		
5	Any of the Tenderer's affiliates participated as a consultant in the preparation of the design or technical specifications of the works that are the subject of the tender.		
6	Tenderer would be providing goods, works, non-consulting services or consulting services during implementation of the contract specified in this Tender Document.		
7	Tenderer has a close business or family relationship with a professional staff of the Procuring Entity who are directly or indirectly involved in the preparation of the Tender document or specifications of the Contract, and/or the Tender evaluation process of such contract.		
8	Tenderer has a close business or family relationship with a professional staff of the Procuring Entity who would be involved in		

	Type of Conflict	Disclosure YES OR NO	If YES provide details of the relationship with Tenderer
	the implementation or supervision of such Contract.		
9	Has the conflict stemming from such relationship stated in item 7 and 8 above been resolved in a manner acceptable to the Procuring Entity throughout the tendering process and execution of the Contract.		

f) Certification

On behalf of the Tenderer, I certify that the information given above is complete, current, and accurate as at the date of submission.

Full Name _____

Title or Designation

_____

(Signature) _____

(Date) _____

3. CERTIFICATE OF INDEPENDENT TENDER DETERMINATION

I, the undersigned, in submitting the accompanying Letter of Tender to the _____ _____*[Name of Procuring Entity]* for:_____*[Name and number of tenders]* in response to the request for tenders made by: _ _____*[Name of Tenderer]* do hereby make the following statements that I certify to be true and complete in every respect:

I certify, on behalf of _____ *[Name of Tenderer]* that:

i) I have read and I understand the contents of this Certificate.

ii) I understand that the Tender will be disqualified if this Certificate is found not to be true and complete in every respect;

iii) I am the authorized representative of the Tenderer with authority to sign this Certificate, and to submit the Tender on behalf of the Tenderer;

iv) For the purposes of this Certificate and the Tender, I understand that the word "competitor" shall include any individual or organization, other than the Tenderer, whether or not affiliated with the Tenderer, who:

   a) Has been requested to submit a Tender in response to this request for tenders;

   b) could potentially submit a tender in response to this request for tenders, based on their qualifications, abilities or experience;

v) The Tenderer discloses that [check one of the following, as applicable]:

   a) The Tenderer has arrived at the Tender independently from, and without consultation, communication, agreement or arrangement with, any competitor;

   b) the Tenderer has entered into consultations, communications, agreements or arrangements with one or more competitors regarding this request for tenders, and the Tenderer discloses, in the attached document(s), complete details thereof, including the names of the

competitors and the nature of, and reasons for, such consultations, communications, agreements or arrangements;

vi) In particular, without limiting the generality of paragraphs (5) (a) or (5) (b) above, there has been no consultation, communication, agreement or arrangement with any competitor regarding:

a) prices;

b) methods, factors or formulas used to calculate prices;

c) the intention or decision to submit, or not to submit, a tender; or

d) the submission of a tender which does not meet the specifications of the request for Tenders; except as specifically disclosed pursuant to paragraph (5) (b) above;

vii) In addition, there has been no consultation, communication, agreement or arrangement with any competitor regarding the quality, quantity, specifications or delivery particulars of the works or services to which this request for tenders relates, except as specifically authorized by the procuring authority or as specifically disclosed pursuant to paragraph (5) (b) above;

viii) The terms of the Tender have not been, and will not be, knowingly disclosed by the Tenderer, directly or indirectly, to any competitor, prior to the date and time of the official tender opening, or of the awarding of the Contract, whichever comes first, unless otherwise required by law or as specifically disclosed pursuant to paragraph (5)(b) above.

Name_____ Title_____

Date_____*[Name, title and signature of authorized agent of Tenderer and Date]*

4. SELF-DECLARATION FORMS

FORM SD1

SELF DECLARATION THAT THE PERSON/ TENDERER IS NOT DEBARRED IN THE MATTER OF THE PUBLIC PROCUREMENT AND ASSET DISPOSAL ACT 2015.

I, ……., of Post Office Box ……. being a resident of …… in the Republic of ……. do hereby make a statement as follows: -

1. THAT I am the Company Secretary/ Chief Executive/Managing Director/Principal Officer/Director of ...…….. *(insert name of the Company)* who is a Bidder in respect of **Tender No.……** for……. *(Insert tender title/ description)* for……. *(insert name of the Procuring entity)* and duly authorized and competent to make this statement.

2. THAT the aforesaid Bidder, its Directors and subcontractors have not been debarred from participating in procurement proceeding under Part IV of the Act.

3. THAT what is deponed to here in above is true to the best of my knowledge, information and belief.

……..…… (Title)
(Signature) (Date)

Bidder Official Stamp

FORM SD2

SELF DECLARATION THAT THE PERSON/TENDERER WILL NOT ENGAGE IN ANY CORRUPT OR FRAUDULENT PRACTICE

I, ... of P. O. Box ..... being a resident of …… in the Republic of ..... do hereby make a statement as follows: -

1. THAT I am the Chief Executive /Managing Director/ Principal Officer/ Director of…….....…… *(insert name of the Company)* who is a Bidder in respect of **Tender No.** …….. for ……. *(insert tender title/description)* for …… *(insert name of the Procuring entity)* and duly authorized and competent to make this statement.

2. THAT the aforesaid Bidder, its servants and/or agents /subcontractors will not engage in any corrupt or fraudulent practice and has not been requested to pay any inducement to any member of the Board, Management, Staff and /or employees and /or agents of……. *(insert name of the Procuring entity)* which is the procuring entity.

3. THAT the aforesaid Bidder, its servants and /or agents /subcontractors have not offered any inducement to any member of the Board, Management, Staff and/ or employees and/ or agents of……. *(name of the procuring entity).*

4. THAT the aforesaid Bidder will not engage /has not engaged in any corrosive practice with other bidders participating in the subject tender

5. THAT what is deponed to here in above is true to the best of my knowledge information and belief.

……..… (Title)

(Signature) (Date)

Bidder Official Stamp

DECLARATION AND COMMITMENT TO THE CODE OF ETHICS

I
.....
..... (person) on behalf of ***(Name of the Business/Company/Firm***)
……. declare that I have read and fully understood the contents of the Public Procurement & Asset Disposal Act, 2015, Regulations and the Code of Ethics for persons participating in Public Procurement and Asset Disposal activities in Kenya and my responsibilities under the Code.

I do hereby commit to abide by the provisions of the Code of Ethics for persons ***participating*** in Public Procurement and Asset Disposal.

Name of Authorized
signatory…..……
Sign…….....…….....

Position…….....…….....
.....……

Office address…….....……
Telephone……. E-mail ….....……
Name of the
Firm/Company…….....

Date…….....

(Company Seal/ Rubber Stamp where applicable)

Witness
Name…….....
.....
Sign…….....
.....

Date…….....
.....

5. APPENDIX 1 - FRAUD AND CORRUPTION

(Appendix 1 shall not be modified)

5.1 Purpose

The Government of Kenya's Anti-Corruption and Economic Crime laws and their sanction's policies and procedures, Public Procurement and Asset Disposal Act, 2015 (the Act) and the Public Procurement and Asset Regulations, 2020 (the Regulations) and any other relevant Kenya's Acts or Regulations related to Fraud and Corruption, and similar offences, shall apply with respect to Public Procurement Processes and Contracts that are governed by the laws of Kenya.

5.2 Requirements

5.2.1 The Government of Kenya requires that all parties including Procuring Entities, Tenderers, (applicants/proposers), Consultants, Contractors and Suppliers; any Sub-contractors, Sub-consultants, Service providers or Suppliers; any Agents (whether declared or not); and any of their Personnel, involved and engaged in procurement under Kenya's Laws and Regulation, observe the highest standard of ethics during the procurement process, selection and contract execution of all contracts, and refrain from Fraud and Corruption and fully comply with Kenya's laws and Regulations as per paragraphs 1.1 above.

5.2.2 Section 66 of the Act describes rules to be followed and actions to be taken in dealing with Corrupt, Coercive, Obstructive, Collusive or Fraudulent practices, and Conflicts of Interest in procurement including consequences for offences committed. A few of the provisions noted below high light Kenya's policy of no tolerance for such practices and behavior:

i) A person to whom this Act applies shall not be involved in any corrupt, coercive, obstructive, collusive or fraudulent practice; or conflicts of interest in any procurement or asset disposal proceeding;

ii) Adperson referred to under subsection (1) who contravenes the provisions of that sub-section commits an offence;

iii) Without limiting the generality of the subsection (1) and (2), the person shall be: -

a) disqualified from entering into a contract for a procurement or asset disposal proceeding; or

b) if a contract has already been entered into with the person, the contract shall be voidable;

iv) The voiding of a contract by the procuring entity under subsection (7) does not limit any legal remedy the procuring entity may have;

v) An employee or agent of the procuring entity or a member of the Board or committee of the procuring entity who has a conflict of interest with respect to a procurement: -

a) Shall not take part in the procurement proceedings;

b) shall not, after a procurement contract has been entered into, take part in any decision relating to the procurement or contract; and

c) shall not be a subcontractor for the tenderer to whom was awarded contract, or a member of the group of tenderers to whom the contract was awarded, but the subcontractor appointed shall meet all the requirements of this Act.

vi) An employee, agent or member described in subsection (1) who refrains from doing anything prohibited under that subsection, but for that subsection, would have been within his or her duties shall disclose the conflict of interest to the procuring entity;

vii) If a person contravenes sub section (1) with respect to a conflict of interest described in sub section (5) (a) and the contract is awarded to the person or his relative or to another person in whom one of them had a direct or indirect pecuniary interest, the contract shall be terminated and all costs incurred by the public entity shall be made good by the awarding officer. Etc.

5.2.3 In compliance with Kenya's laws, regulations and policies mentioned above, the Procuring Entity:

a) Defines broadly, for the purposes of the above provisions, the terms:

i) “corrupt practice” is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;

ii) “fraudulent practice” is any act or omission, including

misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain financial or other benefit or to avoid an obligation;

iii) "collusive practice" is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;

iv) "coercive practice" is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;

v) "obstructive practice" is:

1) Deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede investigation by Public Procurement Regulatory Authority (PPRA) or any other appropriate authority appointed by Government of Kenya into allegations of a corrupt, fraudulent, coercive, or collusive practice; and/or threatening, harassing, or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or

2) acts intended to materially impede the exercise of the PPRA's or the appointed authority's inspection and audit rights provided for under paragraph 2.3 e. below.

b) Defines more specifically, in accordance with the Act, provisions set forth for fraudulent and collusive practices as follows:

"fraudulent practice" includes a misrepresentation of fact in order to influence a procurement or disposal processor the exercise of a contract to the detriment of the procuring entity or the tenderer or the contractor, and includes collusive practices amongst tenderers prior to or after tender submission designed to establish tender prices at artificial non-competitive levels and to deprive the procuring entity of the benefits of free and open competition.

c) Rejects a proposal for award[1] of a contract if PPRA determines that the firm or individual recommended for award, any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/ or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;

d) Pursuant to the Act and the Regulations, the Procuring Entity may recommend to PPRA for sanctioning and debarment of a firm or individual, as applicable under the Act and the Regulations;

e) Requires that a clause be included in the tender documents and Request for Proposal documents requiring (i) Tenderers (applicants/proposers), Consultants, Contractors, and Suppliers, and their Sub-contractors, Sub-consultants, Service providers, Suppliers, Agents personnel, permit the PPRA or any other appropriate authority appointed by Government of Kenya to inspect[2] all accounts, records and other documents relating to the procurement process, selection and/or contract execution, and to have them audited by auditors appointed by the PPRA or any other appropriate authority appointed by Government of Kenya; and

f) Pursuant to Section 62 of the Act, requires Applicants/Tenderers to submit along with their Applications/Tenders/Proposals a "Self-Declaration Form" as included in the procurement document declaring that they and all parties involved in the procurement process and contract execution have not engaged/ will not engage in any corrupt or fraudulent practices.

---

[1]*For the avoidance of doubt, a party's ineligibility to be awarded a contract shall include, without limitation, (i) applying for pre-qualification, expressing interest in A consultancy, and tendering, either directly or as a nominated sub-contractor, nominated consultant, nominated manufacturer or supplier, or nominated service provider, in respect of such contract, and (ii) entering into an addendum or amendment introducing a material modification to any existing contract.*

[2] *Inspections in this context usually are investigative (i.e., forensic) in nature. They involve fact-finding activities undertaken by the Investigating Authority or persons appointed by the Procuring Entity to address specific matters related to investigations/ audits, such as evaluating the veracity of an allegation of possible Fraud and Corruption, through the appropriate mechanisms. Such activity includes but is not limited to: accessing and examining a firm's or individual's financial records and information, and making copies there of as relevant; accessing and examining any other documents ,data and information (whether in hard copy or electronic format) deemed relevant for the investigation/ audit, and making copies there of as relevant; interviewing staff and other relevant individuals; performing physical inspections and site visits; and obtaining third party verification of information.*

PRICE SCHEDULE FORMS

Notes to Tenderers on working with the Price Schedules

1. General

The Price Schedules are divided into separate Schedules as follows:

a) Grand Summary Cost Table

b) Supply and Installation Cost Summary Table

c) Recurrent Cost Summary Table

d) Supply and Installation Cost Sub-Table (s)

e) Recurrent Cost Sub-Tables (s)

f) Country of Origin Code Table

[insert:]

1.1 The Schedules do not generally give a full description of the information technologies to be supplied, installed, and operationally accepted, or the Services to be performed under each item. However, it is assumed that Tenderers shall have read the Technical Requirements and other sections of these tendering documents to ascertain the full scope of the requirements associated with each item prior to filling in the rates and prices. The quoted rates and prices shall be deemed to cover the full scope of these Technical Requirements, as well as overhead and profit.

1.2 If Tenderers are unclear or uncertain as to the scope of any item, they shall seek clarification in accordance with the Instructions to Tenderers in the tendering documents prior to submitting their tender.

2. Pricing

2.1 Prices shall be filled in indelible ink, and any alterations necessary due to errors, etc., shall be initialed by the Tenderer. As specified in the Tender Data Sheet, prices shall be fixed and firm for the duration of the Contract.

2.2 Tender prices shall be quoted in the manner indicated and, in the currencies, specified in ITT 18.1 and ITT 18.2. Prices must correspond to items of the scope and quality defined in the Technical Requirements or

elsewhere in these tendering documents.

2.3 The Tenderer must exercise great care in preparing its calculations, since there is no opportunity to correct errors once the deadline for submission of tenders has passed. A single error in specifying a unit price can therefore change a Tenderer's overall total tender price substantially, make the tender noncompetitive, or subject the Tenderer to possible loss. The Procuring Entity will correct any arithmetic error in accordance with the provisions of ITT 32.

2.4 Payments will be made to the Supplier in the currency or currencies indicated under each respective item. As specified in ITT18.2, no more than two foreign currencies may be used.

1. PRICE SCHEDULE OF SERVICES

Tenderer _____ Name of Tender Number_____

To be completed and submitted as part of the tender document by bidders. Failure to submit **DETAILED** price schedule will lead to automatic disqualification.

Bidders to note:

1. Any material or item not included in the BOQ but is essential for project execution **MUST** be listed, quantified, and quoted for. THE LIST BELOW IS A GUIDE OF MATERIAL REQUIREMENTS AND MAY NOT NECESSARILY BE COMPLETE. It is responsibility of bidder to ensure completeness of his bid quantities, including the costs of all items required in project for its success. A detailed breakdown of any additional item is necessary to ensure all costs are well catered and accounted for. **KPC shall not entertain** variations during project implementation due to bidder's negligence.
2. The prices MUST be quoted in **USD**.
3. The tender sum as submitted and read out during the tender opening as per Public Procurement and Disposal Act 2015 section 82 shall be absolute and final and shall not be the subject of correction, adjustment, or amendment in any way by any person or entity.
4. The prices given shall be verified by the Tenderer as being inclusive of all activities to be implemented in accordance with the tender objective requirements.

The bidder's total sum in Form of Tender shall be inclusive of all applicable Statutory Taxes and Duties. This includes clearing of items at port of entry, transportation to KPC sites, security of items on sites, etc. KPC shall not assist bidder in any way to have materials cleared at points of entry or delivery to sites, hence the pricing above shall be Taxes and Duties **Inclusive.**

Part 1: SUPPLY OF LATEST VERSION OF SCADA SYSTEM

Scope shall cover: Design, Engineering, Procurement, Manufacture, Integration, Factory Testing, Packaging, Training, Forwarding, Supply, Insurance, Custom clearance (if any), Transport to Sites, Unloading at site, Storage at site, Calibration, Field-testing, Installation/Erection, Pre-commissioning, Commissioning, Stabilization of the complete system, supply of Spares.

The nos. (Set / Sites/ No. / Lot / Works) of different items as shown below are subject to change by KPC with unit rate remaining the same.

A. SCADA System Supply

	Supply of Latest Version of SCADA System for Nairobi Control Center & Remote Sites				
No.	**Description**	**Unit**	**Qty**	**Unit Price (USD)**	**Total (USD)**
1.	Supply of redundant rack mounted SCADA real-time server (with all the standard accessories and software including liquid management suites and other application software mentioned in specs) with at least single 24" LCD/LED colour monitor (minimum size), keyboard, mouse, peripheral devices etc.; Latest version of SCADA Software, Latest & compatible Server Operating System Software, SCADA database, networking software, anti-virus software, client software, Redundancy and fail over software modules etc. SCADA Application interface including selectable (dropdown) industry communication drivers, subroutines, and associated software modules etc., all necessary original licenses, media, online documentation, etc. as per specifications.	No	Lot		
2.	Supply of redundant rack mounted Authentication Servers complete with KVM (or any other access option) & at least 22" monitor and all required non-expiry licenses	No	Lot		
3.	Supply and configuration of engineering support tool. A secure VPN and/or remote desktop support to be fully configured by supplier. Activity logs shall be configured for capturing and recording.	No	Lot		
4.	Supply of redundant Historian servers with all standard accessories and latest software (with screen events/ activity playback, archiving/de-archiving, custom reports, ERP integration capability) and Alarm Management Modules for the	No	Lot		

	Supply of Latest Version of SCADA System for Nairobi Control Center & Remote Sites				
No.	**Description**	**Unit**	**Qty**	**Unit Price (USD)**	**Total (USD)**
	SCADA and system.				
5.	Supply and configuration of trending tools for all analog instruments including pressures, temperature, vibration, power, current, speed, etc. for pipeline instruments with high sampling rate to get finer details in trends. Touching instrument icon shall popup a window with trends and any alarm that might be on instrument displayed at bottom of popup window. On the display should be date and time start and end of trend selectors for historical trending, including selectable span and pen, hair with tracking display values at the position.	No	Lot		
6.	Supply of Energy Management module/ Pump and Motor performance efficiency management system. This shall be configured, tested, and commissioned to computed motor energy consumption, energy/pump curves computations etc. for all pumping stations. Best optimized energy consumption scenarios and combinations shall be suggested by system based on required flowrates.	No	Lot		
7.	Supply of at least 12No SCADA operator workstations with at least 4 x 24” Quadra high resolution display, keyboard, mouse, other peripherals, necessary hardware, power, earth and communication cables etc. Shifts change tools be included. The operator workstations to run on Windows operating system	No	Lot		
8.	Supply of at least 2No engineering workstation mounted with 24” LED monitors (minimum size), keyboard, mouse, other peripherals, necessary hardware, power,	No	Lot		

	Supply of Latest Version of SCADA System for Nairobi Control Center & Remote Sites				
No.	**Description**	**Unit**	**Qty**	**Unit Price (USD)**	**Total (USD)**
	earth and communication cables etc. supplied with Latest Engineering Software for SCADA system at Nairobi Control Center. At least 10 concurrent logins must be possible in the engineering machine. The engineering software should be able to link to real-time data for testing and configuration purpose and should not affect operations during such tests. Software to have tools for downloading and applying the tested applications into operator consoles/ workstations once testing and verification is done.				
9.	Supply of redundant backfilling servers at Pumping Stations PS12, PS14, PS8, PS9, PS25, PS27, PS28 and PS15, complete with all necessary non-expiry licenses. The flow computer, Accuload and ATG data be configured for processing and transmitted to NCC, backfilling capability in event of link failure and restoration be configured.	No	Lot		
10.	Supply of redundant rack mounted WEB Server with rack, rack mountable 24” LED monitor (minimum size), rack mounted keyboard, mouse & other peripheral devices etc. Including all software with licenses, media, documentation etc. complete as per specifications tender documents.	No	Lot		
11.	Redundant Main firewall proxy in common racks, other peripherals, necessary hardware, power, earthing, and communication cables etc. Software with licenses, media, documentation etc.	No	Lot		

	Supply of Latest Version of SCADA System for Nairobi Control Center & Remote Sites				
No.	**Description**	**Unit**	**Qty**	**Unit Price (USD)**	**Total (USD)**
12.	Supply of redundant dedicated Firewall equipment for SAP interface	No	Lot		
13.	Supply of Mobile HMI clients that supports Mobile HMI client application for mobile devices such as Tablet, Smart Phones etc. for at least 10 users. Apps be downloadable from App stores (Android and iPhones) to display required views e.g., loading trucks, pipeline stock levels, and any other display KPC may wish seen will be discussed during FDS.	No	Lot		
14.	Supply of tablets/iPads for use for item 14 above	No	10		
15.	Supply of OLED type (or latest technology) display screen-based Video Wall to be installed at existing control room walls facing tank farm covering approximately 10meters by 1meter (Length x Height) along the wall in a continuous manner, operating hardware & other peripherals, necessary software, mounting brackets, necessary converters, extension cables, special cables etc. software with licenses (if any), media, documentation etc.	No	Lot		
16.	Supply of dual local area network managed switches (with layer 3 in OSI reference model capability) in common racks, other peripherals, necessary hardware, power, earthing, and communication patch cords etc. Software, media, documentation etc., complete as per specifications in tender document.	No	Lot		
17.	Supply of interconnect cables like CAT6/OFC/ Communication/special cables if any, connectors etc. (to support redundant configuration)	No	Lot		

	Supply of Latest Version of SCADA System for Nairobi Control Center & Remote Sites				
No.	**Description**	**Unit**	**Qty**	**Unit Price (USD)**	**Total (USD)**
18.	Supply of color laser printer – A3 size, 600 dpi as minimum, Speed 25 ppm (or better), Up to 20,000 pages per month as minimum with 2 port Ethernet cards, for network communication at Nairobi Control Center.	No	2		
19.	Supply of redundant WAN routers in common racks, other peripherals, necessary hardware, power, earthing, and communication cables etc. software with licenses, media, documentation etc.	No	Lot		
20.	Supply of redundant Ethernet Switch for Web Server/Firewall Proxy System with cables, connectors, conduits etc. software, media, documentation etc., complete as per specifications / tender documents.	No	Lot		
21.	Supply of installation accessories including Consoles, Base frame, Fabrication, all required hardware for installation, trays, cables for power, earth, glands, lugs, ferrules, trays-tray covers, base frame, trenching material, route markers etc.	No	Lot		
22.	Supply of Operator chairs suiting the control desks as per specifications.	No	10		
23.	Supply of control room desks as per specifications	No	8		
24.	Supply of Hot Standby Free-Standing Floor Mounted Uninterruptible Power Supply (UPS) as per specifications (minimum 50kVA).	Pair	1		
25.	Supply of GPS Time server in common racks with necessary hardware, power, earthing, and communication cables etc.	No	1		

	Supply of Latest Version of SCADA System for Nairobi Control Center & Remote Sites				
No.	**Description**	**Unit**	**Qty**	**Unit Price (USD)**	**Total (USD)**
26.	Supply of energy meters for all required pumping stations in the tender specifications. (It shall be responsibility of bidder to supply, deliver meters to all sites, install, configure, test, and ensure are communicating to SCADA with required data to meet energy management objectives in the scope)	No	Lot		
27.	Supply of Energy Management Suite for pipeline system in SCADA. The supplier to configure reports for energy management system including power consumption for each station and overall pipeline network, that are accessible by a touch of button and popup display in PDF format. Also, popup trends for a selectable period to be configured, with high sampling rate to get finer details of trends.	No	Lot		
28.	Supply of product scheduling and supply planning tool for KPC system as detailed is the tender specification.	No	Lot		
29.	Supply and delivery of Rack mounted (on backplane) IEC-60870-5 or DNP3 (capable for storage of events and data logs at PLC level in event of link loss to SCADA at NCC) modules for following systems in pump stations: **Schneider Electric's Quantum**: PS1, PS12, PS2, PS4, PS6, PS8, PS10, PS11, PS21A, PS21B, PS24B, PS26, PS27 & PS28. PS22 has installed IEC 60870 module installed. Contractor to configure and link it to Nairobi. **Allen Bradley's Controllogix**: PS3, PS5, PS7, PS9, PS23 and PS24. Only PS24 has installed IEC 60870 module installed. Contractor to configure this module and link	Lot	1		

	Supply of Latest Version of SCADA System for Nairobi Control Center & Remote Sites				
No.	**Description**	**Unit**	**Qty**	**Unit Price (USD)**	**Total (USD)**
	it to Nairobi. **Yokogawa**: PS15 Bidder to configure, test, and commissioning them modules in each station and ensure they communicate with supplied SCADA. *Note: Standalone or DIN rain mounted modules/converters shall NOT be accepted and mounts to* ***automatic disqualification of bid***				
30.	Supply of operator's shift management software tool within SCADA system.	No	Lot		
31.	Supply of predictive maintenance software package to alert operator and maintenance staff of equipment status and deviation from normal operation. The package should gather data from field in real-time and trending shall be possible when recalled by touch of button. The electronic data sheets for instruments shall be possible to upload into system and parameters accessible by touch of button as a PDF in a popup window. Efficiency curves for pumps and motors shall be loaded into system against which real-time curves shall be automatically compared with and violations of set limits shall be alarmed. Current efficiency shall be displayed as percentage on faceplate with curves (real-time and design) when recalled on a touch of button.	No	Lot		
32.	Supply of Product Metering & Proving Suite Module in the SCADA system (at	No	Lot		

	Supply of Latest Version of SCADA System for Nairobi Control Center & Remote Sites				
No.	**Description**	**Unit**	**Qty**	**Unit Price (USD)**	**Total (USD)**
	Nairobi Control Center with backfill from servers at Depots PS8, PS9, PS12, PS14, PS10, PS25, PS27, PS28, KPRL and pump stations PLC backfill modules). Module to compute all product meters in KPC installations and give reports including GSV, GOV, flow rates, loss-gain calculations, correction factors, K-factors, loading station, meter ID, volume moved per customer, inter-tank transfers, operator on duty, customer ID, limit errors, any other information as may be required by KPC on metering.				
33.	Supply of Automatic Tank Gauging (ATG) Suite at Nairobi Control Center SCADA and backfilling servers at PS8, PS9, PS12, PS14, PS25, PS27, PS28 and KPRL (PS15). The suite to gather all data from ATG data from all depots and tabulate each depot and overall reports for levels, volumes moved, tank ID, time of movement, temperature and pressure used, level alarms etc.	No	Lot		
34.	High Level Reporting tools: Supplier to give reporting tool accessible using web browser for KPC managers to access for display only pipeline product inventory, power consumption and pump status, performance of each depot in product dispensing etc.	No	Lot		
35.	Supply of truck loading suite in SCADA. The system to communicate directly with Acculoads in all depots for archiving of data in system to include batch dispensed, Accuload ID, customer etc., with data	No	Lot		

	Supply of Latest Version of SCADA System for Nairobi Control Center & Remote Sites				
No.	**Description**	**Unit**	**Qty**	**Unit Price (USD)**	**Total (USD)**
	retrieval tools included.				
36.	Supply of UPS system Suite. The SCADA supplier to include UPS suite for monitoring healthiness of UPSs in all stations. The data required shall be discussed during detailed engineering of system to included UPS alarms.	No	Lot		
37.	Supply of Fire alarm system Suite: this shall entail connections to Fire alarm systems for all stations within KPC and be represented in graphical and/or network form in SCADA page. The page shall be displayed on touch of a button. Any alarms should be indicated on the system.	No	Lot		
38.	Supply of densitometers where not installed, design, install, test and commission for density indication and batch tracking application	No	Lot		
	Functional Design and Documentation				
39.	Allow for Systems design, engineering, and implementation activities to meet the requirement of contract specification.	No	Lot		
40.	Allow for submission of documentation including As-Built drawings, final system manuals, final configurations documentations, backups etc.	No	Lot		
	Test Tools				
41.	Supply of Portable Diagnostic Test Units (including Laptops) for diagnostic & maintenance functions on any special instrument supplied.	No	4		
42.	Supply of SCADA System application and hardware configuration backup tool	No	Lot		

	Supply of Latest Version of SCADA System for Nairobi Control Center & Remote Sites				
No.	**Description**	**Unit**	**Qty**	**Unit Price (USD)**	**Total (USD)**
	complete with backup integrity test tools. Any license required shall be non-expiry.				
43.	Supply of Digital Multi-meters with built-in signals level meters and with carrying case.	No	4		
44.	Supply of rack mounted UPS for critical SCADA system servers equipment	No	Lot		
45.	Power Distribution Board/ consumer unit for Central UPS system at Nairobi Control Center and Disaster Recovery Site. These shall include breakers for use in existing systems	No	Lot		
46.	Power termination cables for power to all supplied systems	No	Lot		
47.	Supply of pipeline trainer at Nairobi Control Center complete with all required non-expiry licenses	No	Lot		
48.	Supply of pipeline optimizer at Nairobi Control Center complete with all required non-expiry licenses.	No	Lot		
49.	Integration of supplied SCADA system with KPC's SAP system, Accuload systems, Fire, Energy meters, UPS systems, CP stations, DeltaV DCS, M+F's Cotas.	No	Lot		
50.	Allow for Maintenance Contract both for Hardware and Software support (2 years framework) – payable on need basis after warranty period is over.	No	Lot		
51.	Any other item not mentioned explicitly but needed to accomplish project implementation.				

	Supply of Latest Version of SCADA System for Nairobi Control Center & Remote Sites				
No.	**Description**	**Unit**	**Qty**	**Unit Price (USD)**	**Total (USD)**
	(Bidder to itemize and give quote in this format so as to be part of Form of Tender Sum. KPC will not take responsibility of any additional item(s) presented by bidder and not part of sum in Form of Tender).				
	Sub-Total for SCADA System				

Part 2: INSTALLATION, TESTING AND COMMISSIONING OF SCADA SYSTEM

	Installation of SCADA & APPLICATION System				
	Description	**Unit**	**Qty**	**Unit Price (USD)**	**Total (USD)**
1.	Installation, testing, powering up and commissioning of ALL items in Part 1	No	Lot		
2.	Installation, testing, and commissioning of pipeline trainer at Nairobi Control Center	No	Lot		
3.	Installation, testing, and commissioning of pipeline optimizer at Nairobi Control Center	No	Lot		
4.	Migration and cutover from old to the new system without any data loss and not affecting KPC operations	No	Lot		
	Sub-Total				

FAT and Training

Note:

The training and FAT costs shall be quoted exclusive of cost for Return airfares, out of pocket allowances for staff, local transport at country of training, meals, accommodation for entire period.

	Description	**Unit**	**Qty**	**Unit Price (USD)**	**Total (USD)**
	TRAINING				
1.	Certified Overseas Maintenance Technical Training expenses at manufacturer's premises for SCADA system covering entire training period.	Person	8		
2.	Certified Overseas Maintenance Technical Training expenses at manufacturer's premises for Energy Management and pump optimizer modules covering entire training period.	Person	6		
3.	Certified Overseas Technical Training expenses for product Scheduling and planning tool covering entire training period.	Person	3		
4.	Certified Overseas Operator Technical Training expenses on SCADA System at manufacturer's premises	Person	12		
5.	Local training on SCADA, System security, product scheduling and accounting, energy management and Pipeline Simulator & Trainer expenses including meals and	Person	40		

	snacks for staff during the entire training period.				
	FACTORY ACCEPTANCE TESTS				
6.	Factory Acceptance Tests expenses covering entire period for SCADA system and Control Room Desk	Person	6		
7.	Factory Acceptance Tests expenses covering entire period for UPS	Person	3		
	System Development and Skills Transfer				
8.	All Levels Certification Overseas and local SCADA System Engineering and Development expenses for staff attached to project covering entire period The bidder to note any number of trips required in & out of KPC to manufacturer's premises and give provision for them.	Person	3		

Optional Item

This item not to be included in sum being carried to Form of Tender but MUST be quoted for to enable KPC make decision on installation.

No.	Description	Unit	Qty	Unit Price (USD)	Total (USD)
1.	System Disaster Recovery on SCADA Application system. This shall be a full mirror of application system to be installed at remote location within KPC facilities.	Lot	1		

Name of Tenderer: _____

Date _____ Authorized Signature of Tenderer: _____

2. Supply and Installation Cost Summary Table

Costs MUST reflect prices and rates quoted in accordance with ITT17 and 18.

Summary of Pricing for SCADA Supply and Installation

No.	Description	Amount (USD)
1.	Total costs for Part 1	
2.	Total costs for Part 2	
3.	All applicable taxes	
4.	Training and FAT	
	TOTAL (Inclusive all Taxes) to be carried to FORM OF TENDER	

Name of Tenderer:

_____

_____Date

_____

Authorized Signature of Tenderer:

3. Recurrent Cost Summary Table – NOT APPLICABLE

Costs MUST reflect prices and rates quoted in accordance with ITT 17 and ITT18.

Item No.	**Subsystem / Item**	**Recurrent Cost Sub-Table No.**	***[insert: Kenya shilling] Price***	***[insert: Foreign Currency A] Price***	***[insert: Foreign Currency B] Price***
	Subtotals (to Grand Summary Table)				

Note: Refer to the relevant Recurrent Cost Sub-Tables for the specific components that constitute the Sub system or line item in this summary table.

Name of Tenderer:

_____

Date_____

Authorized Signature of Tenderer:

_____

4. Country of Origin Code Table

Country of Origin	Country Code	Country of Origin	Country Code	Country of Origin

QUALIFICATION FORMS

1. FOREIGN TENDERERS 40% RULE

Pursuant to ITT 4.11, a foreign tenderer must complete this form to demonstrate that the tender fulfils this condition.

ITEM	Description of Work Item	Describe location of Source	COST in K. shillings	Comments, if any
A	Local Labor			
1				
2				
3				
4				
B	Subcontracts from Local sources			
1				
2				
3				
4				
C	Local materials			
1				
2				
3				
4				
5				
D	Use of Local Plant and Equipment			
1				
2				
3				
4				
5				
E	Add any other items			
1				
2				

ITEM	Description of Work Item	Describe location of Source	COST in K. shillings	Comments, if any
3				
4				
5				
6				
	TOTAL COST LOCAL CONTENT			
	PERCENTAGE OF CONTRACT PRICE			

2. Form ELI-1 Tenderer Information Form

[The Tenderer shall fill in this Form in accordance with the instructions indicated below. No alterations to its format shall be permitted and no substitutions shall be accepted.]

Date: .....*[insert date (as day, month and year) of Tender submission*]

ITT No.: .....*[insert number of Tendering process]*

Alternative No.: .....*[insert identification No if this is a Tender for an alternative]*

1. Tenderer's Name [*insert Tenderer's legal name]*
2. In case of JV, legal name of each member: *[insert legal name of each member in JV]*
3. Tenderer's actual or intended country of registration: *[insert actual or intended country of registration]*
4. Tenderer's year of registration: *[insert Tenderer's year of registration]*
5. Tenderer's Address in country of registration: *[insert Tenderer's legal address in country of* registration*]*
6. Tenderer's Authorized Representative Information Name: *[insert Authorized Representative's name]* Address: *[insert Authorized Representative's Address]* Telephone/Fax numbers: *[insert Authorized Representative's telephone/fax numbers]* Email Address: *[insert Authorized Representative's email address]*
7. Attached are copies of original documents of *[check the box(es) of the attached original documents]* ☐ Articles of Incorporation (or equivalent documents of constitution or association), and/or documents of registration of the legal entity named above, in accordance with ITT 4.4. ☐ In case of JV, Form of intent to form JV or JV agreement, in accordance with ITT 4.1.

☐ In case of state-owned enterprise or institution, in accordance with ITT 4.6 documents establishing: • Legal and financial autonomy • Operation under commercial law • Establishing that the Tenderer is not under the supervision of the Procuring Entity ☐ Included are the organizational chart, a list of Board of Directors, and the beneficial ownership.

3. Form ELI-1 Tenderer's JV Members Information Form

[The Tenderer shall fill in this Form in accordance with the instructions indicated below. The following table shall be filled in for the Tenderer and for each member of a Joint Venture].

Date: .....*[insert date (as day, month and year) of Tender submission*]

ITT No.: .....*[insert number of Tendering process]*

Alternative No.: .....*[insert identification No if this is a Tender for an alternative]* Page_____of_____pages

1. Tenderer's Name: *[insert Tenderer's legal name]*
2. Tenderer's JV Member's name: *[insert JV's Member legal name]*
3. Tenderer's JV Member's country of registration: *[insert JV's Member country of registration]*
4. Tenderer's JV Member's year of registration: *[insert JV's Member year of registration]*
5. Tenderer's JV Member's legal address in country of registration: *[insert JV's Member legal address in country of registration]*

6. Tenderer's JV Member's authorized representative information

Name: *[insert name of JV's Member authorized representative]*

Address: *[insert address of JV's Member authorized representative]*

Telephone/Fax numbers: *[insert telephone/fax numbers of JV's Member authorized representative]*

Email Address: *[insert email address of JV's Member authorized representative]*

7. Attached are copies of original documents of *[check the box(es) of the attached original documents]*

☐ Articles of Incorporation (or equivalent documents of constitution or association), and/or registration documents of the legal entity named above, in accordance with ITT 4.4.

☐ In case of a state-owned enterprise or institution, documents establishing legal and financial autonomy, operation in accordance with commercial law, and they are not under the supervision of the Procuring Entity in accordance with ITT 4.6.

☐ Included are the organizational chart, a list of Board of Directors, and the beneficial ownership.

4. Form CON–1 Historical Contract Non-Performance and Pending Litigation.

In case a pre-qualification process was conducted this form should be used only if the information submitted at the time of pre-qualification requires updating

Tenderer's Legal Name:_____Date: _____ JV member Legal Name: _____ _____ _____ ITT No.: _____ _____

Age of_____pages

Non-Performing Contracts in accordance with Section III, Evaluation and Qualification Criteria			
Contract non-performance did not occur during the stipulated period, in accordance with Sub- Factor 2.2.1 of Section III, Evaluation Criteria			
Pending Litigation, in accordance with Section III, Evaluation and Qualification Criteria			
No pending litigation in accordance with Sub-Factor 2.2.3 of Section III, Evaluation Criteria Pending litigation in accordance with Sub-Factor 2.2.3 of Section III, Evaluation Criteria, as indicated below			
Year	Outcome as Percent of Total Assets	Contract Identification	Total Contract Amount (current value, US$ equivalent)
_____ _	_____	Contract Identification: Name of Procuring Entity: Address of Procuring Entity: Matter in dispute:	_____

_____ _	_____	Contract Identification: Name of Procuring Entity: Address of Procuring Entity: Matter in dispute:	_____

5. Form EXP - 1 Experience – General Experience

Tenderer's Legal Name:________________________________
__________________Date:_____________ JV Member Legal Name:
____ITT No.:
____________________________________ Page______of__pages

Starting Month / Year	Ending Month / Year	Years*	Contract Identification	Role of Tenderer
______	______		Contract name: Brief Description of the Information System performed by the Tenderer: Name of Procuring Entity: Address:	_________
______	______		Contract name: Brief Description of the Information System performed by the Tenderer: Name of Procuring Entity: Address:	_________
______	______		Contract name: Brief Description of the Information System performed by the Tenderer: Name of Procuring Entity: Address:	_________
______	______		Contract name: Brief Description of the Information System performed by the Tenderer: Name of Procuring Entity: Address:	_________
______	______		Contract name: Brief Description of the Information System performed by the Tenderer: Name of Procuring Entity: Address:	_________

Starting Month / Year	Ending Month / Year	Years*	Contract Identification	Role of Tenderer
_____	_____		Contract name: Brief Description of the Information System performed by the Tenderer: Name of Procuring Entity: Address:	_____

*List calendar year for years with contracts with at least nine (9) months activity per year starting with the earliest year.

6. Form EXP – 2 Specific Experience

Tenderer's Legal Name: _____ Date: _____

JV Member Legal Name: _____ ITT No.: _____

Page _____ of _____ pages

Similar Contract Number: ___ of ___ required.	**Information**		
Contract Identification	_____		
Award date Completion date	_____ _____		
Role in Contract	☐ Prime Supplier	☐ Management Contractor	☐ Subcontractor
Total contract amount	_____		US$_____
If member in a JV or subcontractor, specify participation of total contract amount	_____ %	_____	US$_____
Procuring Entity's Name:	_____		

Similar Contract Number: ___ of ___ required.	**Information**
Address: Telephone/fax number: E-mail:	_____ _____ _____ _____ _____ _____ _____

7. Form EXP – 2 (cont.) Specific Experience (cont.)

Tenderer's Legal Name: _____ Page _____ of _____ pages

JV Member Legal Name: _____

Similar Contract No. __ [insert specific number] of [total number of contracts] ___ required	**Information**
Description of the similarity in accordance with Sub-Factor 2.4.2 of Section III:	
Amount	_____
Physical size	_____
Complexity	_____
Methods/Technology	_____
Key Activities	_____

8. Form CCC-1 Summary Sheet: Current Contract Commitments/ Work in Progress

Name of Tenderer or partner of a Joint Venture.

Tenderers and each partner to a Joint Venture tender should provide information on their current commitments on all contracts that have been awarded, or for which a Form of intent or acceptance has been received, or for contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued

Name of contract	**Procuring Entity, contact address/tel./fax**	**Value of outstanding Information System (current US$ equivalent)**	**Estimated completion date**	**Average monthly invoicing over last six months (US$/month)**
1.				
2.				
3.				
4.				
5.				
etc.				

9. Form FIN – 1 Financial Situation

Historical Financial Performance

Tenderer's Legal Name: _____Date: _____

JV Member Legal Name: _____ITT No._____

Page _____ of _____ pages

To be completed by the Tenderer and, if JV, by each member

Financial information in US$ equivalent	Historic information for previous _____ (__) years (US$ equivalent in 000s)						
	Year 1	Year 2	Year 3	Year …	Year n	Avg.	Avg. Ratio
Information from Balance Sheet							
Total Assets (TA)							
Total Liabilities (TL)							
Net Worth (NW)							
Current Assets (CA)							
Current Liabilities (CL)							
Information from Income Statement							
Total Revenue (TR)							
Profits Before Taxes (PBT)							

Attached are copies of financial statements (balance sheets, including all related notes, and income statements) for the years required above complying with the following conditions:

a) Must reflect the financial situation of the Tenderer or member to a JV, and not sister or parent companies.

b) Historic financial statements must be audited by a certified accountant.

c) Historic financial statements must be complete, including all notes to the financial statements.
d) Historic financial statements must correspond to accounting periods already completed and audited (no statements for partial periods shall be requested or accepted).

10. Form FIN –2 Average Annual Turnover

Tenderer's Legal Name: _____ Date: _____

JV Member Legal Name: _____

Page _____ of _____ pages

Annual turnover data (applicable activities only)		
Year	Amount and Currency	US$ equivalent
*Average Annual Turnover		

*Average annual turnover calculated as total certified payments received for work in progress or completed, divided by the number of years specified in Section III, Evaluation and Qualification Criteria, Sub-Factor 2.3.2.

11. Form F-3 Financial Resources

Specify proposed sources of financing, such as liquid assets, unencumbered real assets, lines of credit, and other financial means, net of current commitments, available to meet the total cash flow demands of the subject contract or contracts as indicated in Section III, Evaluation and Qualification Criteria.

Source of financing	**Amount (US$ equivalent)**
1.	
2.	
3.	
4.	

12. Personnel Capabilities

i) Key Personnel

Name of Tenderer or partner of a Joint Venture

Tenderers should provide the names and details of the suitably qualified Personnel to perform the Contract. The data on their experience should be supplied using the Form PER-2 below for each candidate.

1.	**Title of position:** …	
	Name of candidate:	
	Duration of appointment:	[*insert the whole period (start and end dates) for which this position will be engaged*]
	Time commitment: for this position:	[*insert the number of days/week/months/ that has been scheduled for this position*]
	Expected time schedule for this position:	[*insert the expected time schedule for this position (e.g. attach high level Gantt chart*]
2.	**Title of position: …**	
	Name of candidate:	
	Duration of appointment:	[*insert the whole period (start and end dates) for which this position will be engaged*]
	Time commitment: for this position:	[*insert the number of days/week/months/ that has been scheduled for this position*]
	Expected time schedule for this position:	[*insert the expected time schedule for this position (e.g. attach high level Gantt chart*]
3.	**Title of position:** …	
	Name of candidate:	

	Duration of appointment:	[*insert the whole period (start and end dates) for which this position will be engaged*]
	Time commitment: for this position:	[*insert the number of days/week/months/ that has been scheduled for this position*]
	Expected time schedule for this position:	[*insert the expected time schedule for this position (e.g. attach high level Gantt chart*]
4.	**Title of position:**	
	Name of candidate	
	Duration of appointment:	[*insert the whole period (start and end dates) for which this position will be engaged*]
	Time commitment: for this position:	[*insert the number of days/week/months/ that has been scheduled for this position*]
	Expected time schedule for this position:	[*insert the expected time schedule for this position (e.g. attach high level Gantt chart*]
6...	**Title of position:**	
	Name of candidate	
	Duration of appointment:	[*insert the whole period (start and end dates) for which this position will be engaged*]
	Time commitment: for this position:	[*insert the number of days/week/months/ that has been scheduled for this position*]
	Expected time schedule for this position:	[*insert the expected time schedule for this position (e.g. attach high level Gantt chart*]

ii) **Candidate Summary**

Position		**Candidate** □ Prime □ Alternate
Candidate information	Name of candidate	Date of birth
	Professional qualifications	
Present employment	Name of Employer	
	Address of Employer	
	Telephone	Contact (manager / personnel officer)
	Fax	Email
	Job title of candidate	Years with present Employer

Summarize professional experience over the last twenty years, in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

From	**To**	**Company/Project/ Position/Relevant technical and management experience**

iii) **Technical Capabilities**

Tenderer shall provide adequate information to demonstrate clearly that it has the technical capability to meet the requirements for the Information System. With this form, the Tenderer should summarize important certifications, proprietary methodologies, and/or specialized technologies that the Tenderer proposes to utilize in the execution of the Contract or Contracts.

iv) **Manufacturer's Authorization**

Note: This authorization should be written on the Form head of the Manufacturer and be signed by a person with the proper authority to sign documents that are binding on the Manufacturer.

Invitation for Tenders Title and No.:[*Procuring Entity insert: **ITT Title and Number**]*

To:_____[*Procuring Entity insert: **Procuring Entity's Officer to receive the Manufacture's Authorization**]*

WHEREAS *[insert: **Name of Manufacturer**]* who are official producers of _____*[insert: **items of supply by Manufacturer**]* and having production facilities at_____*[insert: **address of Manufacturer**]* do here by authorize_____*[insert: **name of Tenderer or Joint Venture**]* located at_____*[insert: **address of Tenderer or Joint Venture**]* (hereinafter, the "Tenderer") to submit a tender and subsequently negotiate and sign a Contract with you for resale of the following Products produced by us:

We hereby confirm that, in case the tendering results in a Contract between you and the Tenderer, the above-listed products will come with our full standard warranty.

Name *[insert: **Name of Officer**]* in the capacity of *[insert: **Title of Officer]***
Signed_____
Duly authorized to sign the authorization for and on behalf of:_*[insert: **Name of Manufacturer**]* Dated this_____*[insert: **ordinal**]* day of _____ [*insert: **month**], [insert: **year**]. [add Corporate Seal (where appropriate)]*

v) **Subcontractor's Agreement**

Note: This agreement should be written on the Form head of the Subcontractor and be signed by a person with the proper authority to sign documents that are binding on the Subcontractor.

Invitation for Tenders Title and No.:__[*Procuring Entity insert: **ITT Title and***

Number]

To:_____[*Procuring Entity insert:* ***Procuring Entity's Officer to receive the Subcontractor's Agreement]***

WHERE AS *[insert:* ***Name of Subcontractor****],* having head offices at_____ _____*[insert:* ***address of Subcontractor****],* have been informed by____*[insert:* ***name of Tenderer or Joint Venture****] located* at___*[insert:* ***address of Tenderer or Joint Venture****]* (here in after, the "Tenderer") that it will submit a tender in which_____*[insert:* ***Name of Subcontractor****]* will provide_____[*insert:* ***items of supply or services provided by the Subcontractor****]*. We hereby commit to provide the above-named items, in the instance that the Tenderer is awarded the Contract.

Name *[insert:* ***Name of Officer****]*in the capacity of_____*[insert:* ***Title of Officer]*** Signed_____ Duly authorized to sign the authorization for and on behalf of:_____*[insert:* ***Name of Subcontractor****]* Dated this_____*[insert:* ***ordinal****]* day of_____[*insert:* ***month****]*, _____ *[insert:* ***year****]*.

[add Corporate Seal (where appropriate)]

vi) **List of Proposed Subcontractors**

	Item	**Proposed Subcontractor**	**Place of Registration & Qualifications**

13. Intellectual Property Forms

Notes to Tenderers on working with the Intellectual Property Forms

In accordance with ITT 11.1(j), Tenderers must submit, as part of their tenders, lists of all the Software included in the tender assigned to one of the following categories: (A) System, General-Purpose, or Application Software; or (B) Standard or Custom Software. Tenderers must also submit a list of all Custom Materials. These categorizations are needed to support the Intellectual Property in the GCC and SCC.

i) Software List

	(select one per item)			**(select one per item)**	
Software Item	System Software	General-Purpose Software	Application Software	Standard Software	Custom Software

ii) List of Custom Materials

Custom Materials

14. Conformance of System

14.1 Format of the Technical Tender

In accordance with ITT 16.2, the documentary evidence of conformity of the Information System to the tendering documents includes (but is not restricted to):

a) The Tenderer's Preliminary Project Plan, including, but not restricted, to the topics specified in the TDS ITT 16.2. The Preliminary Project Plan should also state the Tenderer's assessment of the major responsibilities of the Procuring Entity and any other involved third parties in System supply and installation, as well as the Tenderer's proposed means for coordinating activities by each of the involved parties to avoid delays or interference.

b) A written confirmation by the Tenderer that, if awarded the Contract, it shall accept responsibility for successful integration and interoperability of all the proposed Information Technologies included in the System, as further specified in the Technical Requirements.

c) Item-by-Item Commentary on the Technical Requirements demonstrating the substantial responsiveness of the overall design of the System and the individual Information Technologies, Goods, and Services offered to those Technical Requirements.

   In demonstrating the responsiveness of its tender, the Tenderer must use the Technical Responsiveness Checklist (Format). Failure to do so increases significantly the risk that the Tenderer's Technical Tender will be declared technically non-responsive. Among other things, the checklist should contain explicit cross-references to the relevant pages in supporting materials included the Tenderer's Technical Tender.

   Note: The Technical Requirements are voiced as requirements of the *Supplier* and/or the *System*. The Tenderer's response must provide clear evidence for the evaluation team to assess the credibility of the response. A response of “yes” or “will do” is unlikely to convey the credibility of the response. The Tenderer should indicate *that*–and to the greatest extent practical–*how* the Tenderer would comply with the

requirements if awarded the contract. Whenever the technical requirements relate to feature(s) of existing products (e.g., hardware or software), the features should be described and the relevant product literature referenced. When the technical requirements relate to professional services (e.g., analysis, configuration, integration, training, etc.) some effort should be expended to describe how they would be rendered – not just a commitment to perform the [cut-and-paste] requirement. Whenever a technical requirement is for the Supplier to provide certifications (e.g., ISO9001), copies of these certifications must be included in the Technical Tender.

Note: The Manufacture's Authorizations (and any Subcontractor Agreements) are to be included in Attachment 2 (Tenderer Qualifications), in accordance with and ITT 15.

Note: As a matter of practice, the contract cannot be awarded to a Tenderer whose Technical Tender deviates (materially) from the Technical Requirements – *on any Technical Requirement*. Such deviations include omissions (e.g., non-responses) and responses that do not meet or exceed the requirement. Extreme care must be exercised in the preparation and presentation of the responses to all the Technical Requirements.

d) Supporting materials to underpin the Item-by-item Commentary on the Technical Requirements (e.g., product literature, white-papers, narrative descriptions of technical approaches to be employed, etc.). In the interest of timely tender evaluation and contract award, Tenderers are encouraged not to overload the supporting materials with documents that do not directly address the Procuring Entity's requirements.

e) Any separate and enforceable contract(s) for Recurrent Cost items which the TDSITT17.2 required Tenderers to tender.

Note: To facilitate tender evaluation and contract award, Tenderers encouraged to provide electronic copies of their Technical Tender– preferably in a format that the evaluation team can extract text from to facilitate the tender clarification process and to facilitate the preparation of the Tender Evaluation Report.

14.2 Technical Responsiveness Checklist (Format)

Tech. Require. No. _	**Technical Requirement:** ***[insert: abbreviated description of Requirement]***
Tenderer's technical reasons supporting compliance:	
Tenderer's cross references to supporting information in Technical Tender:	

FORM OF TENDER SECURITY- [Option 1–Demand Bank Guarantee**]**

Beneficiary: **_____**
Request for Tenders No: **_____**
Date: **_____**
TENDER GUARANTEE No.:_____
Guarantor: _____

1. We have been informed that_____(herein after called "the Applicant") has submitted or will submit to the Beneficiary its Tender (herein after called" the Tender") for the execution of_____under Request for Tenders No._____("the ITT").

2. Furthermore, we understand that, according to the Beneficiary's conditions, Tenders must be supported by a Tender guarantee.

3. At the request of the Applicant, we, as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of_____(_____) upon receipt by us of the Beneficiary's complying demand, supported by the Beneficiary's statement, whether in the demand itself or a separate signed document accompanying or identifying the demand, stating that either the Applicant:

   a) has withdrawn its Tender during the period of Tender validity set forth in the Applicant's Letter of Tender ("the Tender Validity Period"), or any extension thereto provided by the Applicant; or
   b) having been notified of the acceptance of its Tender by the Beneficiary during the Tender Validity Period or any extension there to provided by the Applicant, (i) has failed to execute the contract agreement, or (ii) has failed to furnish the Performance.

4. This guarantee will expire: (a) if the Applicant is the successful Tenderer, upon our receipt of copies of the contract agreement signed by the Applicant and the Performance Security and, or (b) if the Applicant is not the successful Tenderer, upon the earlier of (i) our receipt of a copy of the Beneficiary's notification to the Applicant of the results of the Tendering process; or (ii)

thirty days after the end of the Tender Validity Period.

5. Consequently, any demand for payment under this guarantee must be received by us at the office indicated above on or before that date.

[signature(s)]

Note: All italicized text is for use in preparing this form and shall be deleted from the final product.

FORMAT OF TENDER SECURITY [Option 2–Insurance Guarantee]

TENDER GUARANTEE No.: _____

1. Whereas …… [*Name of the tenderer]* (hereinafter called "the tenderer") has submitted its tender dated …… [*Date of submission of tender]* for the …… *[Name and/or description of the tender]* (hereinafter called "the Tender") for the execution of___under Request for Tenders No._____("the ITT").

2. KNOW ALL PEOPLE by these presents that WE …… of …… [**Name of Insurance Company**] having our registered office at …… (hereinafter called "the Guarantor"), are bound unto …….. [*Name of Procuring Entity*] (hereinafter called "the Procuring Entity") in the sum of …… (Currency and guarantee amount) for which payment well and truly to be made to the said Procuring Entity, the Guarantor binds itself, its successors and assigns, jointly and severally, firmly by these presents.

   Sealed with the Common Seal of the said Guarantor this ___day of _____ 20 __.

3. NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the Applicant:

   a) has withdrawn its Tender during the period of Tender validity set forth in the Principal's Letter of Tender ("the Tender Validity Period"), or any extension thereto provided by the Principal; or

   b) having been notified of the acceptance of its Tender by the Procuring Entity during the Tender Validity Period or any extension thereto provided by the Principal; (i) failed to execute the Contract agreement; or (ii) has failed to furnish the Performance Security, in accordance with the Instructions to tenderers ("ITT") of the Procuring Entity's Tendering document.

then the guarantee undertakes to immediately pay to the Procuring Entity up to the above amount upon receipt of the Procuring Entity's first written demand, without the Procuring Entity having to substantiate its demand, provided that in its demand the Procuring Entity shall state that the demand arises from the occurrence of any of the above events, specifying which event(s) has occurred.

4. This guarantee will expire: (a) if the Applicant is the successful Tenderer, upon our receipt of copies of the contract agreement signed by the Applicant and the Performance Security and, or (b) if the Applicant is not the successful Tenderer, upon the earlier of (i) our receipt of a copy of the Beneficiary's notification to the Applicant of the results of the Tendering process; or (ii)twenty-eight days after the end of the Tender Validity Period.

5. Consequently, any demand for payment under this guarantee must be received by us at the office indicated above on or before that date.

_____

_____

[Date] *[Signature of the Guarantor]*

_____

_____

[Witness] *[Seal]*

Note: All italicized text is for use in preparing this form and shall be deleted from the final product.

TENDER - SECURING DECLARATION FORM {r 46 and155(2)}

[The Bidder shall complete this Form in accordance with the instructions indicated]

Date: ..... *[insert date* (as day, month and year) of Tender Submission]

Tender No.: ..... *[insert number of tendering process]*

To: ..... *[insert complete name of Purchaser]*

I/We, the undersigned, declare that:

1. I/We understand that, according to your conditions, bids must be supported by a Tender-Securing Declaration.

2. I/We accept that I/we will automatically be suspended from being eligible for tendering in any contract with the Purchaser for the period of time of [insert number of months or years] starting on [insert date], if we are in breach of our obligation (s) under the bid conditions, because we–(a) have withdrawn our tender during the period of tender validity specified by us in the Tendering Data Sheet; or (b) having been notified of the acceptance of our Bid by the Purchaser during the period of bid validity, (i) fail or refuse to execute the Contract, if required, or (ii) fail or refuse to furnish the Performance Security, in accordance with the instructions to tenders.

3. I/We understand that this Tender Securing Declaration shall expire if we are not the successful Tenderer(s), upon the earlier of:

    a) Our receipt of a copy of your notification of the name of the successful Tenderer; or
    b) thirty days after the expiration of our Tender.

4. I/We understand that if I am/ we are/ in a Joint Venture, the Tender Securing Declaration must be in the name of the Joint Venture that submits the bid, and the Joint Venture has not been legally constituted at the time of bidding, the Tender Securing Declaration shall be in the names of all future partners as named in the letter of intent.

Signed:

…….....

.....

Capacity / title (director or partner or sole proprietor, etc.) …….....…….

Name:
…….....
Duly authorized to sign the bid for and on behalf of: _____ [insert complete name of Tenderer] Dated on…… day of ……. [Insert date of signing]
Seal or stamp

PART 2 – PROCURING ENTITY'S REQUIREMENTS

SECTION V – REQUIREMENTS OF SUPPLY, INSTALLATION, CONFIGURATION, TESTING AND COMMISSIONING OF SCADA SYSTEM UPGRADE

(INCLUDING TECHNICAL REQUIREMENTS, IMPLEMENTATION SCHEDULE, SYSTEM INVENTORY TABLES, BACKGROUND, AND INFORMATIONAL MATERIALS)

Pipeline System

KPC handles refined product that is imported and pumped in storage tanks at either Kipevu Oil Storage Facility (KOSF) or at Kenya Petroleum Refineries Limited (KPRL). This product is normally pumped from the Jetty at Kipevu Oil Terminal (KOT) at Onshore at Mombasa. KOT Jetty systems include a custody metering system, ESD, Leak Detection System, Motor Operated Valves among other systems and devices.

The pipeline system currently consists of 450 km of Line-1 and Line V each, running in parallel on KPC's Right of Way from the port of Mombasa to Nairobi, 325 km of Line-2 from Nairobi to Eldoret, 121 km of Line-3 from Sinendet to Kisumu, 121 km of Line-6 from Sinendet to Kisumu and 324 km of Line-4 from Nairobi to Eldoret. The installed maximum flow rate for Line-1 is 880 m^3 per hour while Line-2 and 3 have a combined flow rate of 220 m^3 per hour, Line-4 and 6 on the other hand has an installed flow rate of 800 m^3 per hour but currently operating at 378m^3/hr, whereas Line V has a designed flow rate of 1000m^3 per hour.
The pumping stations on Line 1 are Kipevu Oil Storage Facility (PS14), Changamwe (PS1), Samburu (PS2), Maungu (PS3), Manyani (PS4), Mtito Andei (PS5), Makindu (PS6), Sultan Hamud (PS7), Konza (PS8), Embakasi (PS9) and Nairobi Terminal (PS10). Line V has same naming as Line 1 except the inclusion of letter A in Pumping Station (PS) e.g., PS14A, PS1A etc. up to PS10.

Line 2 consist of PS21A (Nairobi), PS22 (Ngema), PS23 (Morendat), PS24A (Soilo), PS25 (Nakuru), PS26A (Sinendet) and PS27(Eldoret). Line 3 is a branch-off on Line 2 starting at Sinendet (PS26A) and terminate at PS28 (Kisumu). Sinendet (PS26A) to Kisumu (PS28) flow via gravity hence no pump station on Line 3.

Line 4 consists of PS21B (Nairobi), PS24A (Soilo), PS26B (Sinendet) and into PS27 (Eldoret). Line 6 is a branch-off at PS26B to Kisumu (PS28). Line 6 has no pumping station given flow is via gravity as Line 3.

Both Line 2 and Line 4 draw product from PS10. The pipeline is controlled from PS10 in a control room commonly known as Nairobi Control Center (NCC).
Major part of KPC pipeline is buried except at pumping stations. The average distance between pumping stations is approximately 65km. The depots are located at Kipevu (PS 14), Moi International Airport (PS12), Embakasi (PS9), Nairobi Terminal (PS10), Nakuru (PS25), Eldoret (PS27) and Kisumu (PS28). In addition, the company operates common-user road and rail tanker loading facilities at Nakuru, Eldoret and Kisumu. There are various custody transfer points namely at PS14 (Kipevu Oil Storage Facility), PS8 (Konza), PS10 (Nairobi terminal), among others. With exception of PS14, all other depots have truck loading facilities.

Within PS10 depot, KPC has a custody transfer system utilizing PS10 tanks to issue product to Oil Marketing Companies (OMCs) via dedicated product lines. This custody transfer system is commonly referred to as PS11.

Pipeline Branch-offs
At PS14 (KOSF), there exist spur line which some Oil Marketers use to pump fuel to their depots located Shimanzi. There is also T-Off connection to Kenya Petroleum Refineries Limited (KPRL) for pumping refined product from Jetty or KOSF to tanks at KPRL.
At PS1, there is a branch off to PS12 which handles Jet-A1. There also exist a branch off at PS8 (Konza) on Line 1 and Line V which is used to draw product from the two pipelines into a 3rd party storage facility commonly known as Petrocity.
There is also a branch off to PS9 depot from both Line 1 and Line V.

Product sources into KPC pipelines
KPC receives product from the following sources:

1. **Kipevu Oil Terminal 1 and 2**: this is a jetty located at Mombasa where ships with white oils dock. The jetty has, among other systems, the custody transfer metering, ESD and process control systems. The product is offloaded into KPC's PS14 depot tanks.

2. **VTTI Terminal**: this is a 3rd party depot that has pipelines connected into KPC's PS14 depot at the booster pumps manifold. The product is received for pumping into Line V and Line 1. There exists a custody transfer meter on this connection.
3. **KPRL (PS15)**: this is depot that is connected into KPC's PS1 at the mainline pumps manifold. The product is received for pumping into Line V and Line 1. There exists a custody transfer meter on this connection

1. General Scope

This section specifies the Scope of Works to be covered under this tender.

A. Health Safety and Environment (HSE)

1.1 The Contractor shall always execute the works in a safe and secure manner and actively practice safety throughout the term of the contract and shall comply with the applicable KPC HSE policy & regulations.

1.2 The contractor shall establish project procedures and work instructions in line with the KPC HSE policy & regulations to be adhered to by all workers and sub-contractors under this contract.

1.3 The employer's HSE representative shall have the right to visit and inspect the work location any time prior to commencement of the works and during the performance of the work to ensure that a safe working environment is maintained.

1.4 Prior to entering the work area all employees of the contractor and its sub-contractors shall receive appropriate training given by the employer of the applicable HSE regulations. The employees will be required to demonstrate their understanding of this training. All training on site shall be conducted in English.

1.5 The contractor shall ensure that all his employees and subcontractors entering the site of works adorn the appropriate personal protective equipment (PPEs) for the specific site as shall have been outlined in KPC HSE regulations.

1.6 Where the employer has evidence that the contractor, his employees, or subcontractor has violated the provisions of this clause and the KPC HSE policy & regulations, the employer shall immediately suspend the works, until the situation is rectified.

1.7 Time extension shall not be considered for any time lost as a result of such suspension.

B. DESIGN AND ENGINEERING OF SCADA SYSTEM UPGRADE AND ASSOCIATED SYSTEMS

1.1 These specifications herein are the **minimal requirements as set by KPC and the contractor is supposed to come up with latest industry practice in addition to these specifications**. The additional requirements as designed by contractor must be included in Bill of Quantities, clearly quantified, and priced accordingly.

1.2 The Contractor shall carry out the complete system design of hardware & software for SCADA and Associated Systems for Nairobi Control Center.

1.3 The contractor to supply, install, test and commission hardware & software for SCADA and associated systems as per approved designs.

1.4 The contractor to carry out complete system design of hardware & software for slave Terminal Manager Systems at KPC depots at Kipevu (PS14), Konza (PS8), Nakuru (PS25), Eldoret (PS27), Kisumu (PS28) and Kenya Petroleum Refineries Limited (KPRL - herein referred to as PS15). These terminal managers must have data backfilling capability with time-stamped logs in event of link loss and synchronize with Nairobi Control Center (NCC) which shall be the Master SCADA when link is restored.

1.5 The Contractor shall carry out submissions of detailed engineering of the functional design specifications, software design specifications, graphics & interface development specifications, final Bill of Quantities, power calculations, heat loads, panel footprints, weight of the equipment, grounding and earthing scheme, foundation details, space requirement, floor cut out dimensions, Power distribution from separate feeders etc.

1.6 The Contractor shall carry out submissions of all engineering deliverables as per details provided in the Technical Specifications. Submission of engineering details with all third-party interfaces.

1.7 The Contractor shall carry out system configuration of all equipment, databases, interfaces, graphics, screen displays, reports etc.

1.8 Design, Supply, site specific configuration, Factory and Site testing, Installation, and commissioning of software for entire KPC pipelines to be installed at remote sites and Nairobi Control Center.

1.9 Integrate some functionalities of the SCADA system with KPC's SAP system.

1.10 Configure SCADA network security.

1.11 Factory and Site training on SCADA and associated systems.

1.12 Warranty support including software updating services for newer revision in software for the duration of Warranty support period.

1.13 Annual Maintenance support services including Software updating services for newer revision in Software after end of defects liability period.

1.14 Configuration and integration of LDS into SCADA system

C. SCOPE OF SUPPLY & WORK FOR CENTRAL ups system

The SCADA contractor shall design, supply, installation, testing, and commissioning of Uninterruptible Power Supply (UPS) that meets power demand and requirements of all equipment/systems in the PS10 Equipment room, Control Room including the SCADA and all Associated system in accordance with the technical specification of this tender document. The spare capacity of at least 30% must be indicated by a way of total power computation.

D. SCOPE OF SUPPLY & WORK FOR ENERGY METERING

The SCADA contractor shall supply, installation and commissioning of Energy Meters, Software, and connectivity to SCADA system in accordance with the technical specification of this tender document. This will also form the basis of mainline pump/pipeline performance efficiency management system (pipeline optimizer).

E. SCOPE OF SITE SERVICES

The Contractor shall provide the following site services, but not limited to:

a) Unloading & unpacking of all supplied equipment.

b) Transporting material to relevant locations.

c) Installation of all panels, equipment hardware and any supplied material at minimum.

d) Fabrication of support for equipment, base frame for panels.

e) Mounting workstation/Consoles/mounting table or such other items

f) Mounting of racks or such other items

g) Supply, laying and termination of cables at supplied equipment and at panels.

h) Supply of communication cabling from supplied equipment to KPC backbone communication equipment

i) Carrying out trenching works and backfilling for cables.

j) Carrying out hot works/ tapping for equipment installations as per system specifications.

k) Supply and installation of required cable glands for interconnection of cables

l) Supply, installation, glanding, ferruling and termination of interconnection of cables up to Cabinets.

m) Installation of the communication links within the SCADA and other systems under scope of supply.

n) Installation and commissioning of supplied Central UPS.

o) Distribution of A.C/D.C Power within Contractor's racks and consoles etc.

p) Obtaining relevant permits and approvals for site work.

q) Obtaining site entry passes for Contractor's Manpower.

r) Powering up of the system to complete commissioning of system

s) Loading/checking of system configuration.

t) Establish communication in all relevant systems.

u) Hardware/Software additions/deletion/changes

v) Carrying Site Acceptance Test

w) Assistance in loop checking.

x) Integration of various sub-systems (e.g., LDS, Energy management, Pipeline optimization etc.), third party system; SAP MII, TAS, TIS, telecommunication etc.

y) Resolving functionality issues as may arise for a period of 24 months after commissioning of pipeline SCADA Upgrade system.

z) Tuning of the system

aa) Availability of Hardware/Software Engineers during Warranty period.

bb) Generation of Over, Shortage & Damage (OS&D) reports as required and providing further necessary assistance to KPC for Insurance claims.

cc) Issue final reconciliation report for all the material used.

dd) After installation check all drawings for correct installation in accordance with the relevant drawings.

ee) Modify the site changes in drawings & bring all drawings to as built level. All changes to be documented and countersigned by the KPC engineer.

ff) Provision of temporary power supply during construction/ commissioning phase if KPC's supplies are not available.

gg) Support in terms of Spares, Maintenance Contracts, Manpower, Training:

i) Provide complete details for commissioning spares, backup spares etc. to justify availability of system at 99.9% with MTBF & MTTR figures considered in calculations.

ii) Provide complete details of comprehensive maintenance contract.

iii) Training: Provide complete details of training facilities available for following:

- System engineering
- Hardware maintenance
- Application software
- Configuration
- Pipeline Application System
- Operator training
- Interface training

F. Scope of supply for Terminal Management system

All KPC depots and KPRL shall be supplied with a terminal manager server which shall be connected to Accuload systems, flow computers, ATG and loading data presenting devices and ensure the records are configured for onward transmission to SCADA. It shall be responsibility of supplier of system/servers to connect to the depot devices and configure the data into the Terminal Servers.

G. FACILITIES TO BE PROVIDED BY KPC

The following facilities will be provided by KPC:

a) Documentation on existing system(s), from which the Contractor can extract the information required for system configuration.
b) Input/output signal to PLC drawings
c) P&IDs of existing systems
d) Instrument index including ranges, controller actions and alarm/trip settings for database generation.
e) Control building layout.
f) Incoming AC (Mains) for UPS power feeder.
g) Ethernet links to telecommunication system
h) OFC backbone
i) Back up Communication Link

H. SCOPE OF SUPPLY & WORKS: OTHER REQUIREMENTS

1.1 The Contractor shall undertake full responsibility for providing a complete and Latest version of SCADA System and Associated Systems with open architecture, meeting the objectives, functional and specific requirements described in the technical specifications.

1.2 The scope of supply and works of SCADA supplier shall also include the following:

a) Fulfilment of complete Telemetry requirements for monitoring and control as per various P&IDs and I/O count.
b) Fulfilment of leak detection requirements, Batch scheduling and tracking and other Applications requirements. Batch scheduling function shall be discussed in detail with the contractor during functional design stage.
c) Fulfilment of Energy Management System in this supply.
d) Installation and fulfilment of pipeline trainer and simulator.
e) Connections to Acculoads in depots to pick and store transactions data.

1.3 The warranty support shall include the following as a minimum during the entire two (2) years period:

a) Troubleshooting of entire hardware and software supplied
b) Upgrade of software including antivirus software as and when the upgrades &/or the patches are released.
c) Modification of hardware/software logics as per operational and maintenance requirements
d) All the consumables except printer cartridges and paper to be supplied.
e) Systems Experts shall be available to attend any number of breakdown calls during entire warranty period.

1.4 The material to be delivered and works performed shall meet the technical specifications and the requirements detailed.

1.5 Supply of all the items/equipment & Test equipment software, installation materials, spares etc. required to execute the SCADA Upgrade and Associated System complete in all respects.

1.6 Performing all works required for designing, engineering of SCADA systems integration, testing, supply, installation, interfacing with communication channels and instrumentation & electrical systems, commissioning (with supply of commissioning spares including

consumables) site testing, test run & putting into operation of the system complete in all respects.

1.7 Furnishing all documentation, drawings, and other information required here-in including user operation and maintenance manuals, handbook of inventory (with serial number of equipment/Part number/Make & Model Number) of all the equipment supplied & installed.

1.8 Furnishing as-built documentation, drawings, and soft copies of the complete system. The as-built documentation drawings (6 sets of binders/folders) and 6 sets of CDs shall be furnished prior to commencement of warranty, after incorporating all modifications made at site.

1.9 Further as a part of deliverables, supplier shall make available (prior to commencement of warranty) two sets of system software, SCADA software, LDS Interface software, Firewall, Application software as finally configured for the system to KPC on the system readable storage used media (DVDs, etc) and takes care of the user licenses for all the software used in the system to be endorsed in the name of KPC for use in maintenance and operation of this project.

1.10 In addition to furnishing as-built documentation, drawings and CDs of the complete system as stated above, relevant documents/drawings of system shall be available in document folder/pocket of given SCADA cabinets.

1.11 Supply of signal cables & connectors, glands and laying of cables between Cabinets for covering respective station parameters, PLC systems & RTUs and other systems in the control room covering all sites including dressing, ferruling, glanding & termination of cables etc. at both the cable ends.

1.12 Co-ordination/interfacing (including obtaining relevant details for connectivity) with Instrumentation during engineering phase and during installation & commission phase of the project and obtaining the relevant details for wiring, termination, serial link details etc.

1.13 The civil works including modification of flooring associated with the installation of supplied equipment at stations.

1.14 The electrical works associated with the installation and commissioning of the equipment, earthing of equipment, powering of equipment at all sites, termination of cables as required to applicable standards.

1.15 Co-ordination (including obtaining relevant details for connectivity) with Electrical supply during installation & commissioning phase of the project Supply and laying of communication cables for interconnection between Nairobi Control Center /routers/switches and remote stations with the Communication Equipment in the equipment room.

1.16 Co-ordination (including obtaining relevant details for connectivity) with Electrical works during installation & commissioning phase of the project.

1.17 Training of KPC's personnel in the operation and maintenance of the installed SCADA Upgrade & Applications systems.

1.18 System Warranty including all services and supply of spares including consumables spares for operation and maintenance of the system including transportation (to & fro) of faulty equipment.

2 TECHNICAL SPECIFICATIONS FOR SCADA UPGRAGE

2.1 Purpose

These Specification describes the minimum technical requirements which must be met by bidder for a Supervisory Control and Data Acquisition (SCADA) Upgrade and Associated systems for Kenya Pipeline Company. **It is responsibility of contractor to design, supply, install, configure, test and commission the SCADA Upgrade (including NCC UPS) to ensure objectives of KPC are achi**eved.

2.2 Pipeline system Description

2.2.1 The pipeline is majorly divided into two sections, namely Eastern and Western Lines. In Eastern, we have Line I and Line V which run from Mombasa to Nairobi along same right of way with an average separation

distance of 5 meters. Most of KPC pipelines is buried and run through municipalities, towns, game parks, road and railway-crossings, river-crossings, sparsely populated areas, densely populated areas etc.

Line I consist of twelve (12No) stations: PS14 (Kipevu Oil Storage Facility), P12 (Moi International Airport), PS1 (Changamwe), PS2 (Samburu), PS3 (Maungu), PS4 (Manyani), PS5 (Mtito Andei), PS6 (Makindu), PS7 (Sultan Hamud), PS8 (Konza), PS9 (Embakasi) and PS10/11 (Nairoi Terminal).

Line V consists of five (5No) pumping stations, as Line I descriptive names, namely: PS14A, PS1A, PS3A, PS5A, PS7A and a provision of four (4) future stations: PS2, PS4, PS6, PS8.

Western line currently consists of lines namely Line II, III, IV and Line VI. The total number of stations in the Western line are as follows:

Line II: PS21A (Nairobi Terminal), PS22 (Mai Mahiu), PS23 (Morendat), PS24 (Soilo), PS25 (Nakuru), PS26A (Sinendet), PS27 (Eldoret), PS28 (Kisumu)
Line III: PS26A (Sinendet), PS28 (Kisumu)
Line IV: PS21B (Nairobi Terminal), PS24B (Soilo), PS26B (Sinendet), PS27 (Eldoret)
Line VI: PS26B (Sinendet), PS28 (Kisumu)

There are also Depots within KPC facility. These depots have Automatic Tank Gauging (ATG) systems used for product inventory function as part of the Tank Inventory System (TIS). The existing ATG manufacturers include Rosemount and Endress + Hausser systems.
PS12, PS9, PS25, PS27 and PS28 depots also have truck loading facilities with PD meters, Acculoads (Presets), FuelFACS. Additionally, there is COTAS system from M+F at PS12 and PS9.

The other systems within KPC include CCTV, UPSs and Fire Alarm systems at various pumping stations and other KPC facilities. KPC has installed a comprehensive Hydrant Monitoring system at PS9 (Embakasi)

& PS12 (Moi Airport Mombasa) depots supplied by M+F for product accounting purpose.

Pipeline Branches

At PS14 (KOSF), there exist spur line which some Oil Marketers use to pump fuel to their depots located Shimanzi. There is also T-Off connection to Kenya Petroleum Refineries Limited (KPRL) for pumping refined product from Jetty or KOSF to tanks at KPRL.

At PS1, there is a branch off to PS12 which handles Jet-A1. There also exist a branch off at PS8 (Konza) on Line 1 and Line V which is used to draw product from the two pipelines into a 3rd party storage facility commonly known as Petrocity.

2.3 Pipeline system Operations

2.3.1 Global pipeline operation

The pipeline is normally controlled from Nairobi Control Center (NCC) referred to as PS10 where Master SCADA resides. Setpoints and commands to field devices are sent from NCC by respective remote sites (through RTUs/PLCs) and commanded accordingly. These parameters include pressure set points, pump speeds, pump loading, commands that can be sent as coils, integers (unassigned or signed) etc. with pipeline operators keying in as whole numbers, percentage values or sliding faceplates. The SCADA equipment status, ESDs, temperature of various devices and equipment, vibration levels etc. from field devices are received at SCADA for display and as well as actioning should need be.

Various parameters from instrumentation along pipeline are received in Nairobi Central SCADA in real-time. The parameters are used to control and monitor the overall operation of the pipeline. The field instruments in the remote station are controlled by DCS/PLCs/RTU installed at each station.

Line V pipeline pump-sets are controlled by DeltaV DCS with HMI consoles located at NCC.

Required:

The pipelines need be integrated in the SCADA for operation from central point. All stations including Line V shall be integrated into one SCADA system for control and monitoring.

2.3.2 Depots operation

Depots are normally manned for smooth operations. SCADA receives all parameters and events for archiving and inventory. The parameters include Tanks Inventory System (TIS), metering systems, ESDs in depots, truck loading data etc.

Required:

The operation processes in the depots must be recorded in SCADA at both local and NCC levels. A terminal manager shall be supplied in the depots with capability to record all transaction in the depots, archive them, timestamp, and backfill to NCC should link loss occur. The system should be capable of generating reports both for product movements (in and out) and system maintenance. Moreover, the SCADA shall have a lockout function to be enforced for equipment under maintenance/overdue for maintenance until they are handed back to Operations Department for usage.

2.3.3 Pump-overs/ Product transfers to Oil Marketers

PS11 to OMCs, PS14 to SOT, PS14 to PS15, PS8 to Petrocity

Pump Station No.11 is located within Nairobi depot. There exists metering system to Oil Marketing Companies. The pump-overs operation include:

a. Shipper entitlement and Kenya Revenue Authority checks done, majorly involving manual/paperwork. This is done by others and entered in SAP system.
b. If the shipper has entitlement, then receiving nomination ticket from SAP system to SCADA is done, confirming shipper is eligible to volume tendered.
c. Once a volume entitlement is confirmed, the operator keys in volume required to be pumped to a shipper. The volume keyed in should not be more than the tender scheduled. If this happens, a flag is raised, and operator requested to key correct volume. The entitlement

volume of a given shipper shall be as received from SAP. SCADA volume shall not exceed this value.

At this point, a provision shall be given in SCADA volume input to do partial volume delivery or whole as per nomination. Should partial delivery done, the system shall automatically deduct from the nominated volume. Continuation of volume issuance shall be possible. The same shipper shall not be issued with a new nomination till the partial ticket is closed. However, supervisor shall have a role to edit or cancel the remaining volume and ticket with appropriate login rights.

The operator can continue to issue from the remaining volume on ticket as partial or whole of remaining but cannot exceed remaining volume.

d. Once volume has been entered in system, it shall be possible for the operator to open tank outlet valve.
e. Once tank outlet is opened, it shall then be possible to open boundary valve of the shipper.
f. Once a command to open shipper boundary valve is issued, SCADA system shall automatically take tanking initial readings for tank level and product meter non-resettable volume in GOV. These readings shall form part of report of issuance once nomination ticket is closed (as partial or full).
g. Once boundary valve is fully open, it shall then be possible to start pump.
h. Operator issues start command to pump(s) to begin issuing product for transfer.
i. SCADA checks that the communication to flow meter that is active. If no communication, the pump should not start nor open valve to any marketer, unless he issues an override command (a button provided in SCADA HMI to override this function should communication link to meter not available).
j. Once the volume (in M^3) required for transfer is reached, SCADA issues auto-stop command to pump and closes valves for that operation. Synchronization & tuning shall be required to be done so as not to close valve too early or too late to ensure batched volume issued is accurate as possible.

k. With valves full closed and settling time of 30 mins (configurable) done, the SCADA takes final readings for tank levels and meter non-resettable volumes. These readings are used to compute actual volume transferred using meter data. Tank levels are used for internal inventory records.
l. SCADA issues a transfer completion of the nomination ticket for closure and billing to SAP.

Required:

The operation procedure above to be configured, integrated, tested, and commissioned as required. The metering system shall be integrated, and data log be included for reports generation. Reports to include oil marketer name, ticket/nomination ID, volume transferred, density, temperature, pressure and any other detail that KPC may require be in report. The pumpover volumes shall be scheduled in Gross Observed Volume (GOV) and then completed ticket shall be pushed to SAP as both GOV and GSV for billing. The data shall be available to SAP in at least both OPC and ODBC.

System shall be able to provide dashboard reports on transactions, stock levels etc. on daily and monthly basis.

The system shall be required to have a metering suite for volumetric computation and reporting for stocks, transactions details, volumes transacted in each pumpover with the temperature and pressure data, nominations etc.

KPC requires that **preventive maintenance** on equipment be carried out on regular basis as per approved plan (monthly, 3-monthly, 6-monthly or annually). SCADA system shall raise banner on equipment to alert operations and maintenance required on that equipment. Moreover, the SCADA shall have a lockout function to be enforced for equipment under maintenance/overdue for maintenance until they are handed back to Operations Department for usage.

2.3.4 Loading Depots (PS9, PS12, PS25, PS27, PS28)

The loading depots mentioned have truck loading facilities for dispensing fuel to trucks. There also exists metering (PD, Turbine and Ultrasonic) systems as well as Automatic Tank Gauging (Rosemount Radar) in these depots. Depots have Motorized valves, motor-controlled pumps, switches (contacts) and transmitters in the field.

Required:
In this SCADA upgrade scope, it shall be required that the bidder does include in his offer a slave server with some functions as the Master SCADA at Nairobi Control Center (NCC). These functions shall be limited to the depots and all the event logs, data logs, depot transaction reports and field devices status in that depot be displayed and stored. In the event communication link is lost, the events are stored locally in the server and once link is restored, Master SCADA shall automatically be updated with this data.

System shall be able to provide dashboard reports on transactions, stock levels etc. on daily and monthly basis. These transaction reports shall include important information like, for instance, Transaction ID, Oil Marketer name, time of transaction, person(s) transacting, volumes of product dispensed, product type etc.

It shall also be mandatory that the system have a metering suite to capture all data in transactions of the depots. The volumes loaded, customer(shipper), temperature and pressure, etc. shall be captured. The SCADA supplier MUST get raw data from Acculoads (used in truck loading) into SCADA for storage. There exists FuelFACs accounting system, but this shall not be interfered or connected to SCADA. It is a responsibility of SCADA supplier to ensure Accuload Data has been captured accurately for audit trails into SCADA metering suite.

PS9 and PS12 have M+F Cotas Hydrant monitoring system. The SCADA supplier shall ensure that the system is integrated into the SCADA metering suite at Nairobi Control Center and data is seamlessly captured and stored.

KPC requires that **preventive maintenance** on equipment be carried out on regular basis as per approved plan (monthly, 3-monthly, 6-monthly or annually). SCADA system shall raise banner on equipment to alert operations and maintenance required on that equipment. Moreover, the SCADA shall have a lockout function to be enforced for equipment under maintenance/overdue for maintenance until they are handed back to

Operations Department for usage.

2.3.5 Kipevu Oil Storage Facility (PS14, KOSF)

The facility services as a depot for storage of white oil. The facility has metering systems, Automatic Tank Gauging System (Endress+Hauser), PLCs, Fire alarm system, ESD among other systems. Station consists of motor-controlled booster pumps with several switches (contacts) and analog transmitters in the field.

Required

A slave server with some functions as the Master SCADA at NCC shall be supplied and installed. These functions shall be limited to KOSF and all the event logs, data logs, depot transaction reports and field devices status in that depot be displayed and stored. In the event communication link is lost, the events are stored locally in the server and once link is restored, Master SCADA shall automatically synchronize and update the data.

The operations of this depot include custody transfer metering systems (has both unidirectional and bidirectional meters), Endress+Hauser Automatic Tank Gauging system, product transfer to Shimanzi Oil Terminal. These data must be logged for future trending and reporting.

System shall be able to provide dashboard reports on transactions, stock levels etc. on daily, weekly, and monthly basis.

The Jetty System display and data shall be configured data transmitted to Nairobi as required.

KPC requires that **preventive maintenance** on equipment be carried out on regular basis as per approved plan (monthly, 3-monthly, 6-monthly, or annually). SCADA system shall raise banner on equipment to alert operations and maintenance required on that equipment. The banner should be cleared by a maintenance supervisor with appropriate login credentials. An email shall be sent to maintenance group.

2.3.6 Eastern pumping stations

The pumping stations for Line I (PS1, PS2, PS3, PS4, PS5, PS6, PS7 & PS8) consist of 3No motor-controlled mainline pumps and various switches (contacts) and analog transmitters in the field. Line V stations

(PS1A, PS3A, PS5A, PS7A) have 2No VFD motor controlled mainline pumps.

Required:

- The pumps and the mainline instruments in the system shall be configured and mimics designed to include color status (GREEN for normal OFF/STOPPED/CLOSED, RED for normal RUN/ON/OPEN), under maintenance, on transition etc.

- All pumps energy consumption be monitored, recorded, and report generated. Required combinations be predictively suggested by system depending on required flow rates/batch volumes.

- Deviations from normal operating ranges be configured and alarms and warnings be generated and auto-pop up on alarms banner.

- Alarms due to deviations shall be logged and trends can be called and compared to pump curves that are displayed as a popup window by touch of equipment mimic. The manufacturer operating pump curves shall be loaded during design against which the operating curves shall be compared on same graph using a different color pen.

- Pump monitoring parameters e.g., pressure, temperature and vibration monitoring in real-time trends shall be possible and any violation of limits shall be announced.

- KPC requires that **preventive maintenance** on equipment be carried out on regular basis as per approved plan (monthly, 3-monthly, 6-monthly, annually or on number of hours system has operated). SCADA system shall raise flag on banner and pinned on equipment to alert operations and maintenance required on that equipment. This information should be descriptive enough to alert operator on maintenance required.

  The banner should be cleared by a maintenance supervisor with appropriate login credentials. An email shall be sent to maintenance group.

- Moreover, the SCADA shall have a lockout function to be enforced for equipment under maintenance/overdue for maintenance until they are handed back to Operations Department for usage.

2.3.7 Western pumping stations

All pumping stations for Line II & IV (PS21A, PS22, PS23, PS24; PS21B, PS24B) consist of 2No motor-controlled pumps and various switches (contacts) and analog transmitters in the field. PS21A & B have three booster pumps before the main pumps.

Required:

- The pumps and the main instruments in the system shall be configured and mimics designed to include color status (GREEN for normal OFF/STOPPED/CLOSED, RED for normal RUN/ON/OPEN), under maintenance, on transition, fault etc.

- All pumps energy consumption be monitored, recorded, and report generated. Required combinations be predictively suggested by system depending on required flow rates/batch volumes.

- Deviations from normal operating ranges be configured and alarms and warnings be generated and auto-pop up on alarms banner.

- Alarms due to deviations shall be logged and trends can be called and compared to pump curves that are displayed as a popup window by touch of equipment mimic. The manufacturer operating pump curves shall be loaded during design against which the operating curves shall be compared on same graph using a different color pen.

- Pump temperature and vibration monitoring in real-time trends shall be possible any violation of limits shall be announced.

- KPC requires that **preventive maintenance** on equipment be carried out on regular basis as per approved plan (monthly, 3-monthly, 6-monthly or annually). SCADA system shall raise banner on equipment to alert operations and maintenance required on that equipment. Moreover, the SCADA shall have a lockout function to be enforced

for equipment under maintenance/overdue for maintenance until they are handed back to Operations Department for usage. The banner should be cleared by a maintenance supervisor with appropriate login credentials. An email shall be sent to maintenance group.

2.3.8 Tank volumes in each depot

It shall be possible to give into and out of pipeline volumetric report by use of meters in depots and tank inlet/outlet valves. ATG levels and volumes for the depots shall also be captured in reports as appropriate.
The reports shall be as per depot or as an entire pipeline. The report shall then compute gain or loss of product in the operations per depot and per line.

2.3.9 Existing Communication Facilities

The remote sites are connected to Master SCADA via existing fiber communication system. The fiber is single mode installed in the following manner:
Line 1: FOC is approximately 3 meters on one side & in parallel to pipeline.
Line 2: FOC approximately 3 meters on one side & in parallel to pipeline
Line 5: FOC approximately 1 feet on one side & in parallel to pipeline.
Line 6: FOC approximately 1 feet on one side & in parallel to pipeline.

All fiber lines are in PVC conduit and terminate into an Optical Distribution Frame in each station (approximately 65KM apart). A pair of FOC cable is dedicated for telecontrol (SCADA) communication.

2.3.10 Existing SCADA System

KPC is currently using Schneider Electric's Oasys v.7.4 SCADA system.

2.3.11 Existing PLCs

2.3.11.1 The PLC at the supervised stations are mainly Allen Bradley, Schneider Electric and Emerson's Delta V DCS (for Line V).

2.3.11.2 Plant adaptation is implemented via interface and supervisory marshalling cubicles into which are fitted the necessary command relays, interposing/intermediate relays, transducers etc.

2.3.11.3 The current communication protocols between the Master SCADA at Nairobi Control Center (NCC) and Remote Sites are Modbus TCPIP and Modbus Serial.

2.3.11.4 Delta V system that is used to control Line V is standalone currently with OPC server, Historian and ProPlus servers located at NCC. This is required to be integrated into proposed SCADA System upgrade.

2.3.12 Other systems:

KPC has several product meters ranging from GE sentinel meters that use SpiritIT flow computers installed at PS14 & PS1, Emerson meters using FlowBoss computers (600 & 600+) in Nairobi, Line V and a few Western stations, Krohne's Alto III&V meters using Summit8800 flow computers in PS14, PS10 and in Kisumu Jetty meters, PD meters in most of the Depots, Accuload presets in Depots, M+F Cotas system in PS9 & PS12 system.

KPC also has proving systems including Ultrasonic Master proving meter at PS11, compact piston provers at PS1A, PS9A and PS10A installed on Line V, Turbine proving systems for Line IV at PS21B and other areas that shall be detailed during engineering phase of project.

2.4 Expectations in proposed SCADA upgrade System implementation

2.4.1 Remote sites and 3rd Party connectivity.

System shall be required to communicate with other systems using Modbus (Serial & TCPIP), EthernetIP, Profibus, OPC, DNP3, IEC 60870-5 protocols. These shall be basic **mandatory** protocols in proposed SCADA system. To this end, the proposed SCADA system shall have all possible industrial protocols which shall be selectable using a drop-down menu to communicate with the device being integrated.

2.4.2 Time stamping

The PLC systems in all KPC sites shall be equipped with a timestamping capability. Bidder shall be required to supply, install, configure, test and commission time stamping capable modules in existing PLC systems. The

modules shall be part of PLC backplane modules and not standalone or converter. The configuration shall be such that in event module is on OFF or Fault, the processor to halt operations, till is resolved or bypassed by technical personnel. The modules shall store data events whenever communication link is lost and automatically update the Master SCADA immediately link is restored.

2.4.3 SCADA system features

NO	KEY FEATURES FOR PIPELINE MONITORING SCADA
1.	**Proven Platform:** The Proposed SCADA software shall have proven experience in oil and gas field with no obsolescence.
2.	**Operating System:** The Proposed Pipeline SCADA system shall be independent of operating systems. It shall support UNIX, LINUX and Windows Operating Systems. KPC shall require vendor to configure system with UNIX/LINUX/WINDOWS SCADA servers and Windows for client Workstations. Enhanced security features shall be configured to ensure operation within a secure environment.
3.	**Redundancy:** The Proposed SCADA System shall be Media Independent and support High Availability Computing techniques. The SCADA System shall support full communication and application redundancy, which shall be independent of applied communications media and system server hardware. It shall support for **Dual, Triple, Quad redundant servers** and redundant hard drive configurations (RAID). It shall be independent of applied communications media, geographical distance, different domains, and system server hardware. KPC shall require hot standby servers placed in Main Control Room location at Nairobi and offsite disaster recovery servers placed in backup Control Room at a remote site.
4.	**License Capacity:** The Proposed SCADA System shall be Scalable Architecture. The system shall be capable of handling more than 1 million I/O points within single database environment without requiring for annual license renewals i.e., non-expiry licenses. At least 1/3 of these IO points should be of Analog type (float, INT, Double

NO	KEY FEATURES FOR PIPELINE MONITORING SCADA
	etc.). Project references to be provided along with proposal.
5.	**Web based technology:** The Proposed SCADA System shall be Web based System and the System shall be easily accessible through use of web browsers.
6.	**RDBMS capabilities:** The Proposed SCADA System shall have built-in RDBMS functionality, which shall be utilized to perform more complex queries that pipeline SCADA System does, to have an integration with KPC's own RDBMS environments (MSSQL, ORACLE and alike) in future.
7.	**OPC-UA:** The Proposed pipeline SCADA system shall have OPC-UA capabilities of interface, with backward compatibility with older versions of OPC.
8.	**Data back filling:** The Proposed pipeline SCADA system provide data back filling from pipeline station PLCs. The SCADA should also support IEC 60870-5, DNP3, and other protocols capabilities for interface of pipeline station PLCs.
9.	**Trending:** The Proposed pipeline SCADA software shall have at least 20 pens in single frame and 2D and 3D trending shall be possible. Sampling for trends shall be at high repetitive rates to have smooth and detailed trends. This applies to historical trends as well.
10.	**Trend Module synchronization with Historical alarms:** When moving the trend hairline across the historical or real-time trend timeline the associated alarms and their status at that specific point in time shall be displayed by the proposed pipeline SCADA software.
11.	**Google Earth Styling:** The proposed pipeline SCADA system shall be able to have static google earth maps imported and shall support Google Earth Style' zooming & panning functionality.
12.	**Operator Action Tracking & Playback:** The proposed pipeline SCADA system shall support recording and playback functions of operator actions.
13.	**Dynamic layers and visibility groups:** The proposed pipeline SCADA system shall support this technology which focus the logical separation and management of operational and maintenance information in a structured manner.

NO	KEY FEATURES FOR PIPELINE MONITORING SCADA
14.	**Collaborative Dashboard:** The proposed SCADA shall support a collaborative dashboard capability that allows integration of information from all kinds of data sources such as video streaming (CCTV, CAMs), URL (Internet/Intranet), databases, spreadsheets, pdf documents, etc.
15.	**Tag Name definition:** The proposed SCADA software shall have multi-level item/object tag names up to 128 levels and 255 characters for total that will be common in enterprise level of operations and architectures
16.	**Engineering efficient design:** The proposed SCADA software shall have Object oriented programming, create templates and symbols once and use them as many times for current and future application configurations.
17.	**Mobile HMI clients:** The Proposed SCADA System shall support Mobile HMI client application for mobile devices such as Tablet, Smart Phones and PDA for at least 20 users, without requiring any Java VM to run native SCADA HMI applets. Apps to be developed and be readily available for download from App and Play Stores.
18.	**Web HMI Clients:** The Proposed SCADA System shall support Web HMI client application for 50 remote view only workstations computers. Dedicated Web Server shall be considered for this purpose.
19.	**Alarm Management & Analysis:** The Proposed SCADA system shall provide alarm management & Analysis functionality to avoid operator overload and reduces the risk of critical alarms being overlooked, causing wrong or to late decisions putting safety as well as the continuity and quality of production at stake. The Alarm Analysis system should comply with standard guidelines of ISA 18.2 to ensure alarm system quality and effectiveness.
20.	**Alarm & Event Notification:** The Proposed SCADA System shall provide capability to configure Alarm and event in different level of devices like Web HMI clients, Printers, Pager Systems (Mobile SMS, email) & Acoustics devices. The Alarm and Event information shall be customizable for each device including HMI.
21.	**Integrated Software Platform:** The Proposed SCADA System shall have basic software functions, which shall be associated with web

NO	KEY FEATURES FOR PIPELINE MONITORING SCADA
	based graphical user interface, data acquisition, interaction with field equipment, real time event /alarm management, trending, reporting and storing real-time and historical information etc. without need for having separate hardware and software for each of these functions.
22.	**Connectivity:** The Proposed SCADA system shall communicate with the existing Allen Bradley and Schneider Electric PLCs directly without use of any hardware converter. The system shall also communicate with Delta V using OPC protocol. The communication protocols between the Nairobi Control Center and Remote Sites should be Modbus TCP/IP, Modbus Serial, and IEC 60870-5 for existing PLC.
23.	**Multi product Pipeline Management Solution:** The proposed SCADA system shall provide advanced Multi product liquid Pipeline Management functions as below within SCADA environment without need for any separated system for same. a) Automatic aggregation and storage of flow measurements into hourly, daily, and monthly figures, etc. (and all other data as required of metering). b) Support for remotely initiated and/or automatic meter proving with temperature and pressure compensation. c) Batch Management (Scheduling and tracking). d) Continuous real-time updating of Estimated Time of Arrival for a batch. e) Volume corrections based on API MPMS 12.1. f) Embedded alarm functions on safe operation violation with respect to the Maximum Allowable Operating Pressure per station and segment. g) Tank Inventory management. h) Path/Manifold management. i) Tracking and management of anomalies like pigs/scrapers, merge/hot spots, and interface j) Monitor liquid pipelines for leaks, inventory, and hydraulic profiling. k) Graphic examples (Meter stations, Batch Scheduling, Batch Tracking, Pump stations, Tanks, etc.)

NO	KEY FEATURES FOR PIPELINE MONITORING SCADA
	l) Pipeline optimization (Start/stop data, Peak hour statistics, Efficiency at different head and flow levels, Volume or period statistics, Pump actions or business Rules). m) Pipeline scheduling. n) An additional function to optimize power consumption: Drag Reducing Agent Management (DRAM) that optimizes fluency to reduce the energy required to pump the products through the pipeline. o) Liquid Pipeline Management shall comply with API MPMS 11.1, 12.1.1, 1164, 14.3.1, RP 1165 & RP 1167 Standards.
24.	**SCADA Networking & Security:** The proposed SCADA system shall include following Networking & Security features: a) Redundant firewalls between existing Fiber Optic network and SCADA network. VPN configuration required for any remote access to the network shall be configured in the firewalls. b) Redundant firewalls between SCADA network and existing SAP. The proposed firewall shall facilitate only ports necessary for communication between SAP and SCADA shall be opened. c) Redundant Authentication Server (Active Directory) d) Network Monitoring Server with software for monitoring overall SCADA network. e) System & Network Hardening
25.	**Metering Suite** The metering suite shall form the main integral part of pipeline operations. The system shall perform volumetric calculations for the entire pipeline and give dashboard reports on pipeline stocks. All KPC meters must be visible in this suite and events, data logs and batching shall be available on this module. The batch metering to start and stop batch transfers shall be included as explained elsewhere in these specifications. An overall report for metering systems shall be possible in a single report. It shall also be possible to report on pipeline segment e.g., Line V. Automatic Gain/Loss on metering system shall be computed as a single report into and out of pipeline system.

NO	KEY FEATURES FOR PIPELINE MONITORING SCADA
26.	**Automatic Tank Gauging (ATG) Suite** The SCADA system shall have an ATG suite that collects information from all ATG systems in KPC system in real-time to store in SCADA Tables and data loggers. The information shall be as detailed as possible including GOV, GSV, product and water levels, temperature, density flow rates, pumpable volume, ullage, tank capacity etc. This data must be displayed in detailed form once a tank is clicked. A tank level limit warning alarm shall be configured to warn operator on tank filling/draining levels. The displays shall include all tanks in each depot with arrangement being as per product manifold. The tanks shall be grouped with their appropriate tagging, and coloring be as per product type. The tanks shall have a fill bar to indicate the level and an arrow to show direction of flow.
27.	**Pipeline Energy Management System (EMS)** All pump station energy consumption shall be captured and logged in the system. The SCADA system shall report on power usage in each pump station in addition to global power consumed in each period. Each power meter reading details shall be possible from EMS. The power consumption reports for each pump, station, or device shall be availed in datalog format and shall be possible to trend power consumption for pump station, single pump, pipeline segment and overall pipeline. It shall be possible to export data logs for trending and graphs generation to spreadsheets e.g., MS Excel.
28.	**Pumps and Motors Performance** The performance of the pumps and motors shall require to be captured in SCADA system. The manufacturer data and performance curves shall be configured in system and compared with real-time data collection and any deviation shall be alarmed. Trending of motor and pump performance shall be possible with respect to manufacturer's performance curves on same popup page.
29.	**Fire Alarm System Suite** The SCADA upgrade shall have a fire alarm module that aggregates all Fire Alarming Devices in KPC facilities and pumping stations into information library. This shall be configured in a graphical representation in accordance to building plan detailing exact location

NO	KEY FEATURES FOR PIPELINE MONITORING SCADA
	in the building and floor plan.
30.	**CP stations Suite** The SCADA upgrade shall have a Cathodic Protection monitoring module that aggregates all CPs for KPC pipelines into information library. This shall be configured to detail exact location and status of CP.
31.	**UPS System Module** The SCADA upgrade shall have a UPS System module that aggregates all control systems UPSs in KPC facilities and pumping stations into information library.
32.	**Single ESD Trigger** The Pipeline segments shall each have a single ESD button to shutdown pipeline operations once triggered. The trigger button shall have a confirmation popup to prevent accidental initiation. An overall KPC pipeline system ESD system button shall also be provided to shutdown the entire KPC pipeline as opposed to a segmental pipe.

Note:

All layer 2 & 3 devices shall enforce port security. All ports not in use shall be in shutdown state while those in use shall be mapped to end devices via MAC address. Any attempt to plug in a different device on the port will result in immediate shutdown of that port and the administrator notified, and event logged. However, on plugging back correct device, the communication should resume automatically.

2.5 DETAILED OVERALL SYSTEM REQUIREMENTS

All applications, including pipeline specific applications and SCADA operation functions in use at KPC, shall use a common user interface. This will provide Controllers, support personnel, and Supervisors a single user interface with a common “look and feel” for all SCADA and pipeline management applications. Additionally, the pipeline specific applications shall have the same consistent method as applicable to SCADA functions for utilizing standard objects, symbols, templates, defining points, quality flags, and editing settings, providing support personnel with a consistent configuration and display-editing paradigm for all applications.

The need for a common user interface also includes line balance, batch tracking, hydraulic gradient, X-Y plots, leak detection and associated alarm handling.

No additional keyboards, special purpose monitors or pointing devices shall be required for the Controller to interact with the pipeline applications.

2.5.1 Design Philosophy

2.5.1.1 The proposed SCADA system shall become the foundation for an integrated and distributed computing environment at KPC. The SCADA system shall not only constitute the kernel for horizontal integration, when connecting other computing resources, it shall also facilitate vertical integration, by connecting plant computing resources in Depot stations and Pump stations to a central position for monitoring and control. Thus, the SCADA system shall establish a framework for total information management at KPC.

2.5.1.2 A modern distributed SCADA design shall provide a platform to allow for a full, and integrated, spectrum of functionality for all Oil and Gas Industry/Pipeline applications.

2.5.1.3 Using a concept of open systems architecture, the SCADA system shall offer high control system availability and upgradeability. A distributed architecture, in hardware and software, shall make it possible to meet demanding functional availability requirements. The design shall allow for the SCADA system to meet the Employer's future expansion requirements both in Pipeline system size as well as in functionality. It shall be possible to incorporate new advances in computer technology in the future.

2.5.1.4 The Open Systems Architecture shall provide an integration of separate and decoupled hardware and software modules. It shall be possible for each module to be maintained and be further developed with minimal impact on other modules.

2.5.1.5 Bidder shall provide the following power optimization capabilities as a minimum:

- ✓ Accommodation for various manufacturers pump and performance curves
- ✓ Calculating electrical power usage and costs,
- ✓ Monitoring on power consumption statistics of pump sets.
- ✓ Monitoring maximum electrical power usage and notification if new maximum is anticipated,

2.5.1.6 Set equipment e.g., pump restrictions and business rules.

2.5.2 General Design Criteria

2.5.2.1 *Proven Reliability*

The SCADA system must be reliable and suitable for the critical applications including the large-scale applications in oil & gas, pipeline applications and system MUST have existed in Oil and Gas market in last 15 years. The SCADA software shall use the latest technology and have state-of-art design, with proven performance record. This must have a clear demonstration to have been deployed in the cross-country oil and gas pipeline in at least 3 applications in last 10 years.

2.5.2.2 *Long Term Support*

The SCADA system shall have maximum uptime and shall be functional 24/7 throughout its entire life. It is mandatory that the SCADA system is supportable for minimum period of 15 years and that it is capable to keep up with the constantly increasing demands for information. Therefore, it must be running on an open platform to ensure ease of migration in future to the changing technologies and application software. Backwards compatibility of the SCADA database for new software versions along with the support for older versions must be provided. The supplier must describe the said compatibility has been provided for the offered SCADA software and must guarantee the policy be maintained in the future.

2.5.2.3 *Scalable Architecture*

The Pipeline SCADA System shall have Scalable Architecture. The system shall be capable of handling more than 1 million I/O points within single database environment.

The SCADA software must have a modular structure and a client/server architecture allowing distributed functionality. It shall provide the capability of front-end processing of the I/O data at remote locations but simultaneously it shall be highly scalable, supporting from small to unlimited number of data items. Thus, it shall be reasonable for the SCADA software to have proven implementation in large scale application of having one million I/O points. Also, it is mandatory that the system can be configured and expanded on-line without stopping or interfering with operators' open screens/pages the system. Online editing or modification must be provided for graphics, item (tag) definitions, reports, and I/O drivers.

The SCADA System shall address large scale geographically dispersed pipeline stations, in which there shall be hierarchy of individual Station level Automation Systems possible if required and can also be managed by a central higher-level supervisory system.

2.5.2.4 *High Availability Architecture and Efficient Design*

The Pipeline SCADA System shall be Media Independent and support High Availability architectures. The SCADA System shall support full communication and application redundancy, which shall be independent of applied communications media and system server hardware.

The SCADA System shall support for Dual, Triple, Quad redundant servers, and redundant hard drive configurations (RAID). It shall be independent of applied communications media, geographical distance, different domains, and system server hardware.

The SCADA System shall have basic software functions, which shall be associated with web based graphical user interface, data acquisition, interaction with field equipment, real time event /alarm Management, trending, reporting, and storing real-time and historical information etc. without need for having separate hardware and software for each of these functions.

2.5.2.5 *Open Interfaces to Other Systems*

It is important for customer to have maximum flexibility for the choice of SCADA platforms from viewpoint of long-term maintenance and/or future modification/ expansion of the system. The SCADA server software must be platform independent and have capability to run on multiple platforms such as Windows, Linux or UNIX as required by the user.

The SCADA software must have an open interface to connect 3rd party products like management information systems, leak detection systems, etc. and must support OPC, ODBC and other industry protocols.

The SCADA System shall have support built-in RDBMS functionality, which shall be utilized to perform more complex queries that cross-section Pipeline SCADA System data, to have a integration with end-user own RDBMS environments (MSSQL, ORACLE and alike) in future.

2.5.2.6 *Engineering, Operation and Maintenance features*

Fast Integration

The SCADA software shall have capability to import and download application specific configuration data, which is managed by off-line using commercial software such as MS-Excel, MS-Access or other readable text file, without using SCADA engineering environment. This allows the user to develop/keep the data apart from the SCADA environment and to make the version management on the data easy. Yet, it allows to download the configuration data such as tag data, I/O drivers, history group, programming code, etc. on-line without stopping the system.

Preferably it shall have capability to upload RTU/PLC tag database of brands mentioned herein and to create SCADA database automatically including the faceplate generation so that the user can improve efficiency of the engineering and can avoid discrepancy of the database between RTU/PLC and SCADA.

Object Oriented Programming

Object oriented technology shall be adopted in the engineering tool of the SCADA software for enabling the efficient engineering work. The

function blocks can be defined in hierarchical arrangement by combining the primitive (lower layer) functions and are assignable to the objects (e.g., pumps, valves, meters) as many as required. The changes or modifications made to the function blocks shall be reflected to all assigned objects in the system automatically.

Easy for Maintenance and Modification

The I/O tag name for the SCADA system shall be able to support up to the maximum length of 45 alpha numerical characters, and the I/O tag name shall consist of at least two or more parts. This is to minimize the engineering and for easy maintenance when there are a number of locations where same PLC/RTU configuration might is used. The initial part(s) of the tag name will be direct to each location, and the last part of the tag name of the PLC's can be the same.

The I/O tag of the SCADA system shall also support on-line signal disconnect between the external field signal and the SCADA database, and the SCADA database shall freeze during the signal disconnection.

The disconnection of signal between the external field and SCADA database shall also allow for the situation in which equipment has to be disconnected from the system for maintenance, and to prevent the data being updated.

Intelligent Alarming Function

The alarming function of the SCADA software must be intelligent and programmable to match it to operator's operation procedure. It shall provide capabilities such as assigning alarm priority, defining manual/automatic alarm acknowledgement, repeating alarms after a time limit, grouping alarms, acknowledging group alarm, first-out alarming for suppressing the group alarms, re-routing alarms to different workstation, dynamic changing of alarm priorities, etc. The supplier needs to explain the details of the alarming function of the SCADA software.

The SCADA System shall provide capability to configure Alarm and event in different level of devices like Web HMI & Clients, Printers,

Page Systems (Pagers, SMS, Telephone) & Acoustics devices. The Alarm and Event information shall be customizable for each device including HMI.
The application HMI shall be fully integrated with the SCADA HMI. Common alarm list shall be used for both SCADA and application alarm.

The SCADA system shall support alarm system performance improvement process to avoid operator overload and reduces the risk of critical alarms being overlooked, causing wrong or to late decisions putting safety as well as the continuity and quality of production at stake. The Alarm system should comply with the guidelines of ISA18.2 to ensure alarm system quality and effectiveness.

Built-in Reporting Function

Reporting function of the SCADA system shall be an integral part of the SCADA software. The reports are user definable/configurable and can be created/printed on time base, on an event base and on manual base. They can be output on screen, to printers and/or to disk and can be also exported to email, Excel, etc. And it is possible to send the reports to other destinations such as remote offices via communication links. In case of a printer failure (e.g., out of service, out of paper), it shall be rerouted to another back up printer while the data is always backed up by the disk for a certain period.

Historical Data Record and Storage

The SCADA system shall be able to support scan based and event-based recording. The scan-based recording shall allow the data of the field value to be recorded by the SCADA system at regular intervals and the values of the specified sources are collected. For event based only new value is only collected by the SCADA system when a change is detected in the value of a selected source (i.e., when an event has occurred).

The SCADA system besides having the flexibility to configure to store the historical data in scan or event based, it shall also have the capability to store the database on the item based on the information related to the item is stored in an organized way, to allow relatively simple way for

retrieving the historical data for a given item.

Besides support historical trending display the SCADA system shall also support a playback function that allow user to view historical data through operator displays. The same operator displays that are used to control the system can be used with playback. This gives the appearance of viewing the system as it appeared sometime in the past, which allow engineer for finding problems that happened in the past. And the playback function shall capable in showing at least the alarm and trend data.

Printer Management

The SCADA system shall include the printer management that allows the system manager to use their HMI for configuring the printers that will be used by the SCADA, and the printer management supports printer output via:

- A printer queues.
- An application.
- A file on disk.

The SCADA system shall support on-line changes, add printer destination if required for sending report(s) to different locations. The SCADA system shall also be able to define backup devices for a destination, which will be used when the main device is unavailable.

Tuning Tools to Optimize Performance

The SCADA software shall have diagnostic tools for analysing problems/running conditions and for optimizing performance of the system. Thus, it can tune up the SCADA system by:

- Balancing network traffic between e.g., the server and the workstations in a redundant network
- Preventing queue overflows by adapting queue sizes
- Optimizing scan times of external process variables

2.5.3 Technology and Standards

The Open Systems Architecture shall make the SCADA system *open*

regarding interconnections and system upgradeability, for hardware and software, as well as for data management.

To fulfil this ambition, the product design for the SCADA system shall use:

- International and industry standards, which are appropriate and relevant for network control applications.
- Portable software design, which allows for an efficient migration path when the technology advances.
- Standard computer products which conform to de facto industry norms for efficient distributed computing.

The integrated computing environment shall comprise a mixture of resources connected in a distributed network structure for optimum functional performance. This network shall be built up around local and wide area networks, LANs or WANs, as appropriate.

2.5.4 IT Security

The security of the SCADA systems against external intrusion, virus etc. is essential to maintain secure operation. The following security requirements shall be fulfilled.

2.5.4.1 *Network security*

All information passing on the network shall be safeguarded.
Redundant local area network shall be provided. The network shall be divided in different security zones with both logical and physical isolation.

2.5.4.2 *Authority set up.*

An operator authority function shall be provided defining the authority privileges and operation responsibilities. The authority function shall prohibit unauthorized interventions at different levels, operation of the Pipeline system, data entry and presentation. The authority assignments shall be changeable interactively with user dialogs from system administrators.

2.5.4.3 *Passwords*

The passwords shall be protected when transmitted over the network or stored. The passwords must be changed after a defined time. All the user accounts shall be unique and suspended after three unsuccessful logins.

The following shall be applicable at minimum:

a) Passwords must contain at least eight (8) characters.
b) Passwords should not be based on well-known or easily accessible personal information.
c) All passwords must start with a letter.
d) Passwords must contain at least one uppercase letters, one lowercase letters, at least one numerical and at least one special character.
e) Passwords must not be based on a users' personal information e.g., combination of usernames.
f) Passwords must not be words that can be found in a standard dictionary.
g) Passwords must be changed every 30 days.
h) Old passwords cannot be re-used for a period of 12 months.
i) Users will be notified 10 days in advance of password expiration date. At this time, users will be prompted to select a new password.

2.5.4.4 *Malicious code and anti-virus protection*

Anti-virus shall always be active on all devices, PCs, networks, and laptops. It can also be provided for servers. Means shall be available to keep the anti-virus signature tables updated. If means to acquire such update shall involve external connection, the following shall be applicable at minimum:

a) A firewall shall be used to permit only trusted network to provide the updates.
b) There shall be Access control between the trusted internal network and untrusted external networks.
c) Block unwanted traffic as determined by the firewall rule set.
d) Hide vulnerable internal systems from the external networks.

e) Hide information, such as system names, network topologies, and internal user IDs, from external the network.

f) Log traffic to and from the internal network.

g) Provide robust authentication.

2.5.4.5 *Business continuity*

This shall involve:

a) System design be on Hot Standby.

b) Automated system backup/imaging and logs.

c) Networks to the system shall be redundant.

d) Devices shall be redundant to keep the system working even if a single failure occurs.

e) It shall be possible to switch from one device to another without losing any process data. The switch shall be documented. Even at manual switch-over within a pair of application servers, no data loss (calculated data is preserved).

2.5.4.6 Backup and recovery procedures for information and software must be provided and documented.

2.5.4.7 *Third party access restrictions*

The access by third parties shall be designated to special network areas and kept to minimum.

2.5.4.8 *Change Control*

All changes shall have version control and must be approved prior to implementation.

2.5.4.9 The security of the system shall comply with ISO 17799 and NERC CIP 002 – 009 (or later) Standards.

2.5.5 System Hardening

2.5.5.1 Undertake hardening of process control systems to prevent network-based attacks.

2.5.5.2 Remove or disable unused services and ports in the operating systems and applications to prevent unauthorized use.

2.5.5.3 Understand what ports open and what services and protocols are used by devices (especially embedded devices such as PLCs and RTUs). All unnecessary ports and services should be disabled (e.g., embedded web servers).

2.5.5.4 Ensure all inbuilt system security features are enabled.

2.5.5.5 Where possible restrict the use of removable media (e.g., CDs, USB memory sticks etc.) and if possible, removable media should not be used. Where it is necessary to use removable media then procedures should be in place to ensure that these are checked for malware prior to use.

2.5.6 Backups and Recovery

2.5.6.1 The contractor shall provide KPC with a recovery plan for the process control system. This shall aid KPC in rapid recovery from any incidents such as hardware and software failures to cyber-attacks.

2.5.6.2 The contractor shall provide a recovery plan that allows KPC to prepare for, respond to and recover from a disruptive event, including a cyber-attack. The following criteria should be considered when developing a recovery plan that caters for hardware/ software failures:

a) Determine and document the procedures for responding to a disaster that involves the SCADA center and its services.
b) Acquire additional hardware for disaster recovery plan or locate current backup hardware to a different location.
c) Determine ways to recover from any type of loss including historical data, installation media, application files, configuration files, documents, and software licenses.
d) Establish a strategy to keep the system up to date.
e) Evaluate the set of data and application to restore to its previous state in the event of a disaster.

f) Create a centralized inventory of all software titles and licenses, evaluate the possibility to replicate it in different locations.

g) Provide procedures for performing full or incremental system backups and send copies of backup files to storage array networks off-site. The contractor shall provide procedures for testing these backups as well.

h) Adoption of redundant hardware and fault tolerant systems

i) Fallback mechanisms

j) System backup procedure

2.5.6.3 Therefore, the Contractor shall:

a) Ensure effective backup and recovery procedures are in place and are appropriate for the identified electronic and physical threats.

b) Provide methodology for testing the integrity of backups.

c) Store backups on and off-site locations.

2.5.7 System Monitoring

2.5.7.1 Provide tools to monitor in real-time process control systems, to identify unusual behavior which might be the result of an electronic incident (e.g., an increased amount of network activity could be the result of a worm infection). A variety of parameters should be defined and monitored in real-time and compared with system baselines for normal operation to provide an indication of unusual behavior.

2.5.7.2 Implement internal and external intrusion detection systems and establish 24-hour incident monitoring. These systems should be tailored to the process control environment.

2.5.7.3 Backup important log files and protect from unauthorized access or modification.

2.5.8 Security patching

2.5.8.1 Implement processes for deployment of security patches to process control systems.

2.5.8.2 These processes should be supported by deployment and audit tools.

2.5.8.3 The processes shall make allowance for supplier certification of patches, testing of patches prior to deployment and a staged deployment process to minimize the risk of disruption from the change.

2.5.9 Audit Trail

The system shall have audit trail and event logging. The audit trail shall be accessible and limited to super user levels and shall not be subject to deletion. Replication of audit trails shall be configured on multiple storage on network to prevent loss of information through accidental or intentional system crash.

3 System Hardware Features

3.1 Central SCADA (Nairobi Control Center – NCC)

3.5.1 The SCADA and Associated Systems hardware shall be based on the latest multiple-processor servers or better. Servers equivalent or better than the specifications stated under this tender shall be supplied.

3.5.2 The Supplier shall provide servers considering CPU processing power, memory, and disk storage. The final system configuration shall provide all the required functions and within the shortest response times for data processing.

- The network shall support TCP/IP network connectivity.
- The LAN shall meet IEEE 802.3 standards. LAN shall be on minimum 1000 Mbps speed channel redundant switched network.
- The SCADA database management system shall support database access through, say, SQL.
- Communication protocol between Nairobi Control Center & PLCs shall conform to IEC 870-5-104 (or later) standard.

3.5.3 The SCADA servers supplied shall be meet specifications as minimum, with two as a redundant pair for the real-time database server including the feature for historical database management.

3.5.4 Each server shall have a minimum number of parallel CPUs as defined in these technical specifications and shall be expandable for additional CPUs.

3.5.5 The system shall be completely redundant in design. All aspects of the system shall be duplicated. There shall be dual redundant servers, networks, and storage devices. Individual network cards shall be installed to connect to each LAN.

3.5.6 The SCADA Operating system shall be stored on at least a RAID disk drive and shall be on separate disk drives and drive controllers to the data storage disk drives.

3.5.7 Minimum high-speed RAM size shall be defined (Supplier shall verify amount of RAM required to manage database and achieve the required performance). Memory shall be internally expandable.

3.5.8 Dual redundant power supplies, each fed from a different power circuit and from different sources. Each power supply shall be capable of supplying the entire power requirement of the SCADA System.

3.5.9 The servers shall be designed to be easily serviceable. A rack-layout design with the computers standing on slide-out rails is preferred. They shall be located in a SCADA equipment room together with other equipment such as communications servers and mass storage devices such as the raid disk array, network drives and disk drives.

3.5.10 SCADA server shall be based on redundant multiple processors CPU architecture with minimum FOUR CPUs installed. The Application server, workstations, firewall proxy PC shall be based on multiple processors CPU architecture with at latest redundant CPUs installed.

3.5.11 SCADA shall ensure that the system support for maintenance, upgrade and enhancement/expansion of SCADA system shall be available for 15-years from the expiry of warranty period.

3.5.12 SCADA servers shall be 64-bit high performance multiple processors with 4-processors installed as minimum and latest high speed.

3.5.13 All other server/workstations shall be with two processors installed as minimum and clock speed be latest in market.

3.5.14 LAN shall be on redundant switched network at a minimum 1000 Mbps speed.

3.5.15 SCADA scan tasks/ polling software shall be integral part of core SCADA software running in the main SCADA servers.

3.5.16 GPS time server along with network time protocol shall be provided to synchronize the clocks of workstations on dual LAN and to synchronize the time with Nairobi Control Center.

3.5.17 Static electricity discharging wrist straps shall be provided in all the cabinets.

3.5.18 SCADA supplier shall provide poll time calculations. The polling/scan rate shall be less than 1sec per remote unit.

3.5.19 The analogue values shall be provided to SCADA system in selectable floating-point format (e.g., 16, 32, 64 bits etc.), integers, double words etc.

3.5.20 PLCs/RTUs shall be polled by the Nairobi Control Center for any station change, analogue data change and totalised value update within a defined time interval as required by Application.

3.5.21 The SCADA system shall have a self-diagnostic features and software watch dog timer devices to monitor and report the healthiness of CPU, memory, power supply, communication interfaces and input/output modules at local level.

3.5.22 To take care of long-term communication outage with Nairobi Control Center, some PLCs/RTUs have been designed to also scan the field and store in the memory time stamped 5000 analogue events and 1000 digital

events during the period of communication outage for subsequent retrieval by Nairobi Control Center. Therefore, Nairobi Control Center shall have a capability of event logs time stamping and shall poll to automatically update once communication is restored.

4 System Sizing

4.1 The SCADA & Application system shall be adequate (without adding any software to the already installed system at master control station) to accommodate at least 30% expansion (with respect to additional facilities viz. additional spheres/mounded storage, pumps, additional remote units because of extension of cross country pipeline, expansion of existing remote units, additional remote work stations etc.) without any limitation and without affecting the various system performance parameters of loading and system timings.

4.2 The Nairobi Control Center SCADA system shall have a database capacity accommodating signal within KPC systems. Typically it shall have minimum capacity of:

- Digital inputs – 500000
- Analogue inputs – 10000
- Accumulator inputs – 5000
- Digital outputs – 20000
- Analogue outputs – 5000
- Calculated points – 40000
- SCADA-LDS interface points – 100000

4.3 The SCADA master control station system shall have system MMI minimum capacity of:

- Displays – 500
- Reports – 500
- Real time trending – 6000
- Historical trending – 4000
- Alarm/event buffer – 50000
- Archiving – 50000

Note: *The signal count in clause 2.3.2.2 is typical. It shall be desirable*

to have existing signals catered for and with future expansion capacity of at least 30%. It shall be responsibility of bidder to ensure the signal count has been adequately covered without violating the 1million tags requirement specified herein.

4.4 The Contractor shall note that the SCADA with RTU, memory, disk size, CPU usage and performance parameters shall not be loaded more than 50% at any point of the SCADA and plant operations at all the locations.

4.5 The system functional requirements are operational interface to operate pipeline network, data acquisition, report by exception, data grouping, data priorities, data validity, data integrity, control functions, select check back execute function, telemetry fail/poll inhibit, system date/time facility, system diagnostic & test facility etc. in addition to the following features.

4.6 Configuration mode procedures shall be provided to modify the time-out periods associated with the various types of device control. These time-out periods shall include a maximum time for the Operator to select a control action after device selection in which case the entire control request shall be cancelled. The maximum anticipated time to receive a device status change, after a control sequence has been completed, shall be adjustable under the system configuration mode.

4.7 The server and workstation software operating systems; database and SCADA and Associated systems software shall be provided with 40% spare license capacity for additional clients.

4.8 Provision of protection devices for card level transient suppressors/surge protection/Lightning strike protectors at all locations of installation, on following power/communication lines as a minimum to protect equipment within contract scope of supply from lighting surge indirect current surge & high voltage & current to the acceptable levels thereby protecting the element components and the system itself.

4.9 The products provided shall be of the same quality and type as required by Original Equipment manufacturers and their warranties shall be passed on to The Employer.

4.10 A six-month supply of consumables shall be provided by the Contractor for the Employer's use. The Contractor shall guarantee the availability of spare parts for a period of 3 years after commissioning of all sections of the works.

5 System licensing

KPC desires to have limitless licenses for SCADA and Associated systems. Annually renewed licenses shall not be accepted by KPC.

6 Equipment and minimum requirements in Nairobi Control Center

Item	Description
1.	Dual main application processors in on-line/hot standby mode including: – Disk storage – Network Archive drive (or any other for of storage acceptable to KPC) – Computer terminals. – Operating system and program development non-expiry licenses. – Required number of ports and LAN Interfaces (1000 Mbps minimum). – Redundant power supply system. – 24" (miminum) colour LCD or better technology monitor (with 1280x1024 or better resolution) with keyboard & mouse
2.	Operator workstation including: – Processor – 4 x 24" (minimum) Quadra high resolution display – Disk storage – Keyboard – Mouse – Operating system licenses (non-expiry).
3.	Maintenance workstation including:

Item	Description
	– Processor – 2 x 24” (minimum) high resolution monitors – Disk storage – Keyboard – Mouse – For remote work station required number of ports/drivers and LAN Interfaces (1000 Mbps) for connection with Telecom system. – Dual LAN Interfaces (1000 Mbps) – Operating system licenses (non-expiry)
4.	Training workstation including: – Processor – 2 x 24” (minimum) high resolution monitors – Disk storage – Keyboard – Mouse – Operating system licenses (non-expiry)
5.	Historical data functionality shall be part of SCADA Servers including: – Server – RAID
6.	Dual authentication servers including: – Disk storage – Keyboard – Mouse – Operating system licenses (non-expiry)
7.	Webserver with minimum fifty (50) concurrent users.
8.	System Firewalls
9.	Wall type display of OLED or better technology type, or better technology, large Video display for Collaborative dashboard requirement
10.	Dual leak detection servers including: – Disk storage – Keyboard – Mouse – Operating system licenses (non-expiry)

Item	Description
11.	Alarm Analysis station Requirement
12.	VPN(s) for remote administration.
13.	Time System.
14.	A3 Colour laser printer
15.	Duplicated Local Area Network (LAN) system including: – Cables – Data switches – WAN Router
16.	Redundant Process Communication System
17.	Furniture for the workstations consisting of suitable and ergonomic Control Room Design: furniture, lighting, and sound system.
18.	Uninterruptible Power Supply (Rack mounted for SCADA equipment and Stand-alone (Central) Control room equipment)
19.	Two-year warranty
20.	System Documentation

Important Note!!

If at any stage of system implementation, it is found that the servers & workstations, selected by the Supplier are not having adequate processing power and capacity, e.g., main memory etc. to meet the system performance requirements of this specification, the Contractor shall replace this hardware with better at no cost to KPC.

7 Equipment sizing signals.

Nairobi Control Center shall communicate with remote systems including PLCs, Tank Gauging systems, Product meters, Terminal Automation Systems, Fire alarm systems, UPSs etc.

7.1 PLC Systems

The detailed I/O estimates of the PLCs are as follows (actual sizing to be done by bidder):

7.1.1 Line I

Pump station	Existing PLC	SCADA Signals			
		DO	DI	AO	AI

Pump station	Existing PLC	SCADA Signals			
Pump station 1	Yes	600	800	30	250
Pump station 2	Yes	300	400	30	150
Pump station 3	Yes	500	700	20	200
Pump station 4	Yes	300	400	30	150
Pump station 5	Yes	500	700	20	200
Pump station 6	Yes	300	400	30	150
Pump station 7	Yes	500	700	20	200
Pump station 8	Yes	300	400	30	150
Pump station 9	Yes	200	300	20	40
Pump station 10	Yes	600	800	30	300
Pump station 11	Yes	120	120	10	25
Pump station 12	Yes	150	300	20	40
Pump station 14	Yes	700	1200	20	200

7.1.2 Line II& III

Pump station	Existing PLC	SCADA Signals			
		DO	DI	AO	AI
Pump station 21A	Yes	300	400	20	250
Pump station 22	Yes	250	300	10	200
Pump station 23	Yes	250	300	10	200
Pump station 24	Yes	250	300	10	200
Pump station 25	Yes	500	600	20	200
Pump station 26A	Yes	50	50	5	20
Pump station 27	Yes	500	700	10	50
Pump station 28	Yes	500	700	10	50

7.1.3 Line IV

Pump station	Existing PLC	SCADA Signals			
		DO	DI	AO	AI
Pump station 21B	Yes	300	400	30	150
Pump station 24B	Yes	300	400	30	150
Pump Station 26B	Yes	200	200	10	100

7.1.4 Line V

Pump station	New PLC	SCADA Signals			
		DO	DI	AO	AI
Pump station 1A	Yes	600	800	30	250
Pump station 2A	Yes	300	400	30	150
Pump station 3A	Yes	500	700	20	200
Pump station 4A	Yes	300	400	30	150
Pump station 5A	Yes	500	700	20	200
Pump station 6A	Yes	300	400	30	150
Pump station 7A	Yes	500	700	20	200
Pump station 8A	Yes	300	400	30	150
Pump station 9A	Yes	200	300	20	40
Pump station 14	Yes	200	200	5	50

7.1.5 Line VI

Pump station	Existing PLC	SCADA Signals			
		DO	DI	AO	AI
Pump station 26	Yes	300	400	30	150
Pump station 28	Yes	50	50	5	20

7.1.6 Tank Gauging System

Depot	Existing ATG	SCADA Signals			
		DO	DI	AO	AI
Pump station 14	Yes	-	100	-	600
Pump station 12	Yes	-	80	-	300
Pump station 9	Yes	-	100	-	300
Pump station 10	Yes	-	150	-	700
Pump station 25	Yes	-	150	-	600
Pump station 27	Yes	-	100	-	600
Pump station 28	Yes	-	150	-	600

7.1.7 Fire Alarm System

A provision for DI and DO for each station for fire alarm systems shall be allowed in SCADA. This shall approximately be:

Total DI: 200×31=6,200
Total DO: 50×31=1,150

7.1.8 *Metering and Terminal Automation Systems*

A provision for analogue inputs for metering systems shall be allowed in SCADA. This shall approximately be:
AI: 200×7=1400

The SCADA system shall have integration capability from field Instruments for Diagnostics and Calibration. The SCADA shall have Intelligent Field Management System to handle future intelligent field devices like Foundation fieldbus, ISA 100 wireless etc.

7.1.9 *Legend*

DO = Digital output
DI = Digital Input
AI = Analogue input
AO= Analogue Output

8. WAN Routers

8.1 The WAN router shall be included at SCADA System, interconnected to KPC corporate LAN and over back up communication link. The WAN router for the SCADA system shall meet the requirements of connectivity & communication speeds as stated elsewhere in this contract and shall have same make & model numbers.

8.2 The WAN routers shall be configured to provide communication paths and provide the facility for adaptive packet and message routing through any available communication link. The WAN routers shall provide the facility of multiple protocol router and bridge that provides high bandwidth connections into backbone networks for remote sites.

8.3 The hardware design shall be based on distributed processing architecture with packets forwarding to be performed over the network interface modules. It shall be based on the modular design and architecture and shall allow new network interface cards to be added in the racks without

powering down the unit and ensuring no disruption of service to the network users.

8.4 The routers shall support both intra-area and inter-area routing for transporting messages between nodes and shall support the network routing/ bridging services for TCP/ IP and other industry standard wide area networks/protocols.

9. WEB Servers and Firewalls

9.1 The supplied SCADA system shall be web enabled. The Web server shall be installed in MS and shall support HTTP/XML for web clients. The users using Internet explorer, Google Chrome, Firefox etc browsers shall access the web server at Nairobi Control Center.

9.2 The web displays shall be simple to customize for corporate look & feel using web templates and style sheets. The supplied system shall have the following facilities implemented for the web clients:

a) To view pre-selected/pre-configured MMI displays i.e., graphics with online update and reports using Microsoft Edge, Google Chrome, or Firefox browser through Internet. (The number and format of displays shall be finalized during detailed engineering). The web clients can access these SCADA functions without additional configuration.

b) Access to the SCADA data via web browsers shall be restricted to read only to prevent the possibility of unauthorized modifications.

c) The analogue values & totalizer values to be presented to web server should not be truncated/ rounded.

d) At a time, 50 numbers of concurrent users shall be able to access the web server using Microsoft Edge, Firefox, Google Chrome browser through Internet using secure connection.

9.3 In order to meet the requirements of User Authentication, log in privileges preventing access to unauthorized users & protect the system from network attacks, suite of software & hardware protection levels shall be built in as part of system architecture in a multi-layer concept. The firewall

router providing the functionality of packet filtering & status packet inspection along with main firewall will fulfil this objective.

9.4 The dedicated firewall WAN router shall be provided at SCADA System equipped with necessary hardware/software/interfaces to provide connectivity to the KPC's Internet link. Connections of the web server to the systems outside the SCADA system shall be performed through firewall environment. The firewall shall significantly reduce the processing load on the active SCADA server and the bandwidth requirements of the WAN topologies.

9.5 The firewall environment shall include the following as a minimum:

a) Firewall Router
b) Main Firewall software
c) IPS system on Web server

9.6 The firewall shall be configured to function as the network device providing the only connection between the outside world and the SCADA System, protecting against access & modifications by unauthorized users, prevent importation of viruses and providing the security features of address translation, user authentication & log in privileges, URL filtering, packet filtering, protocol filtering, state control of communications and intrusion detection & logging.

9.7 As a part of firewall configuration, the first step in securing the web server is securing the underlying operating system. Securing the operating system of web server includes the following steps as a minimum:

a) Patch and upgrade the operating system to correct for known vulnerabilities and install minimum OS configuration that is required for web server application.

b) Remove or disable unnecessary services and applications {Software development tools, compilers, Windows NetBios, NFS, Telnet, FTP, Berkley 'r' services, NIS, SMTP etc.}

c) Configure operating system user authentication (use of passwords which are transmitted in clear over the network is strongly discouraged because the information can be intercepted and used by attacker to masquerade as authorized user).

d) Configure resource controls appropriately. (By carefully setting access controls for files, directories, devices, computation resources, the web administrator can reduce the security breaches & provide both confidentiality of information and protect its integrity)

e) Security testing the operating system.

9.8 During the installation of web server, the following, as second step in securing web server should be performed:

a) Install the web server software.

b) Install minimum Internet services required.

c) Apply any patches or upgrades to correct for known vulnerabilities.

d) Create a dedicated physical disk or logical partition (separate from OS & server application) for web content.

e) Remove or disable all services installed by web server application but not required e.g., Gopher, FTP & remote administration.

f) From web server application root directory, remove all the files that are not a part of the web site.

g) Remove all scripts and executable codes.

h) Reconfigure http service banner (and others as required) not to report web server and operating system type and version.

i) Apply appropriate security template or hardening script to the Web server taking care of the following software modules Functionalities:

- *File Integrity Checkers*
  Performs files integrity checking to check whether files have been changed added or deleted and notifies the administrator of any violation of data on network hosts. They utilize cryptographic checksums for critical files & objects comparing them to reference values & flagging the differences to determine whether attackers have altered the system files or executable.

- *Log File Analysis Tools*
  To read log messages from its inputs and write them to set of output files with current date & time and can be used for web server log analysis.
- *Network Sniffers*
  Data & network sniffers and traffic analysers to collect, store, organize & report on all or selected data traffic on network for user to examine the same with ability to view the reconstructed stream of TCP session.
- *Scanning, Enumeration/Vulnerability scanning tools*
  Security auditing programs with dumps of permissions and audit settings for file system, registry, and printers in concise readable format so that holes in the system security can become readily apparent.
- *Configure web server resource & access controls.*
  Typical files to which access should be controlled are files related directly to security mechanisms {Password hash files used in authentication, files containing authorization information used in authentication used in controlling access, cryptographic material used in confidentiality, integrity, and non-repudiation services}, web server log and system audit files, system software and configuration files.

9.9 As a third step in securing web server, employ appropriate network protection mechanism e.g., firewall packet filter router, main firewall proxy, IDS etc. Firewall environment should perform the following functions:

- Filter Packets & protocols
- Perform status Packet Inspection of connections
- Perform proxy operations on selected applications (http. SNMP, FTP etc)
- Log traffic allowed and denied by firewall.
- Provide authentication that does not rely on static reusable passwords that can be sniffed.

10. Networking Communications

10.1 The SCADA servers at Nairobi Control Center shall be connected to dual minimum 1000 Mbps Ethernet switches and routers. All network connections to the servers (from Operator stations, communications servers, and other systems) shall be through the Ethernet switch to allow optimum access to each server.

10.2 All networked devices and workstations shall support SNMP client utilities for the purpose of network management.

10.3 The Contractor shall design, document, and submit the SCADA network node IP addressing scheme and a network plan for approval by KPC at the detailed engineering stage of the project.

10.4 The SCADA network shall be suitable for industrial control application.

10.5 The network TCP/IP addressing scheme and network plan to be submitted shall include sufficient details to describe:

a) Total SCADA network IP addressing range,
b) Nairobi Control Center SCADA to RTU/PLC communication protocol addressing scheme for the encapsulated protocol,
c) Relationships and restrictions between TCP/IP addressing scheme and the Nairobi Control Center SCADA protocol addressing scheme.
d) Method of IP address allocation and backup allocation strategies,
e) Scope of addresses for each domain, site type, equipment type and the network as a whole,
f) Network segmentation and mask ranges,
g) Alternative communication routes and networks,
h) Routing strategies and method of implementation for each of the alternative network communication routes and backup networks,
i) Router configuration routing tables,
j) Router and network timeout delay and retry mechanisms settings throughout the network,
k) Network bridge configuration tables,
l) Network node naming convention,

m) List of protocols necessary for each node to support network plan.

10.6 Where possible standard address prefixes shall be used for the similar equipment types.

10.7 It is preferred Static Configuration Protocol be used as the method of IP address allocation.

10.8 Access to the SCADA network nodes shall be restricted by the firewall system and router equipment.

10.9 There shall be a restricted list of SCADA network nodes made available to external network access via the firewall. Addresses within the SCADA network shall not be used for these external network accesses. For external SCADA network equipment traffic, only.

10.10 Translated IP addresses shall be revealed by the firewall for use by external SCADA network equipment. Firewall proxy shall be loaded with IPS.

11. Firewall and Communications to Other Systems

12.1. Connections to systems and devices outside of the SCADA system shall be performed through a dedicated firewall device. The firewall shall be configured to protect against access by unauthorized Users.

12.2. The firewall shall be a purpose made device designed specifically to be a network firewall device. It shall be connected to the Pipeline Application Software/historical database servers and shall be the only network connection point between the outside world and the SCADA system.

12.3. The firewall shall be configured to protect against unauthorized access. The software supplied shall cover the overall SCADA network.

12.4. The firewall shall:

- Restrict access to the SCADA network to a single point of entry via the firewall server and historian server at Nairobi Control Center.

- Restrict access to WANs and LANs external to the SCADA LAN to the same point of exit through the server firewall.

12.5. The system supplied shall have at least the following functionality:
- Be able to be configured as a bastion host.
- Support proxy server
- Support packet filtering
- Support IP address translation
- Block access to NetBIOS
- Hide computer names and shared resources.
- Block any program sending outbound unauthorised files or data out to the internet.
- Hide and block all standard TCP/IP ports from inbound probe accesses by external network nodes.
- Support perimeter networks
- Dual homed host architectures

12.6. The Contractor shall during the manufacture and testing of the SCADA system discuss with KPC ways, and make recommendations, to configure the firewall server and software to restrict access to the SCADA network. When agreed upon the methods selected shall be implemented by the Contractor as part of the SCADA contract. All costs for this work are included the contractor's price schedule.

12. Remote Access

12.1 Maintain an inventory of all remote access connections and types (e.g., virtual private network or modems).

12.2 Ensure that a valid business justification exists for all remote access connections and keep remote connections to a minimum.

12.3 Implement appropriate authentication mechanisms (e.g., strong authentication) for remote access connections.

12.4 Provide tools for carrying out regular audits to ensure there are no unauthorized remote access connections.

12.5 Implement mechanisms for enabling and disabling remote access connections.

12.6 Restrict remote access to specific machines and for specific users and if possible, at specific times.

12.7 Undertake security reviews of all third parties that have remote access to the control systems.

12.8 Ensure that remote access computers are appropriately secured (e.g., anti-virus, antispam and personal firewalls).

12.9 Any users accessing the control network from remote networks should be required to authenticate using an appropriately strong mechanism such as token-based authentication e.g., RSA.

13. Anti-Virus

13.1 Protect process control systems with anti-virus software on workstations and servers.

13.2 Where anti-virus software cannot be deployed other protection measures should be implemented (e.g., gateway anti-virus scanning)

14. E-Mail and Internet Access

Disable all email and internet access from process control systems.

15. System Hardening

15.1 Undertake hardening of process control systems to prevent network-based attacks.

15.2 Remove or disable unused services and ports in the operating systems and applications to prevent unauthorized use.

15.3 Understand what ports open and what services and protocols are used by devices (especially embedded devices such as PLCs and RTUs). All unnecessary ports and services should be disabled (e.g. embedded web servers).

15.4 Ensure all inbuilt system security features are enabled.

15.5 Where possible restrict the use of removable media (e.g. CDs, USB memory sticks etc.) and if possible, removable media should not be used. Where it is necessary to use removable media then procedures should be in place to ensure that these are checked for malware prior to use.

16. System Monitoring

16.1 Provide tools to monitor in real-time process control systems, to identify unusual behavior which might be the result of an electronic incident (e.g. an increased amount of network activity could be the result of a worm infection). A variety of parameters should be defined and monitored in real-time and compared with system baselines for normal operation to provide an indication of unusual behavior.

16.2 Implement internal and external intrusion detection systems and establish 24-hour incident monitoring. These systems should be tailored to the process control environment.

16.3 Backup important log files and protect from unauthorized access or modification.

17. Security patching

17.1 Implement processes for deployment of security patches to process control systems.

17.2 These processes should be supported by deployment and audit tools.

17.3 The processes should make allowance for vendor certification of patches, testing of patches prior to deployment and a staged deployment process to minimize the risk of disruption from the change.

18. BACKUPS AND DISASTER RECOVERY

The tenderer shall provide KPC with a recovery plan for the process control system. This shall aid KPC in rapid recovery from any incidents such as hardware and software failures to cyber-attacks.

The tenderers recovery plan shall include but is not limited to:

- ✓ Adoption of redundant hardware and fault tolerant systems
- ✓ Fallback mechanisms
- ✓ System backup procedure

Tenderer to provide Incident Detection, Response, and System Recovery plan that allows KPC to prepare for, respond to and recover from a disruptive event, including a cyber-attack. The following criteria should be considered when developing a recovery plan that caters for hardware/software failures:

- ✓ Determine and document the procedures for responding to a disaster that involves the SCADA center and its services.
- ✓ Acquire additional hardware for disaster recovery plan or locate current backup hardware to a different location.
- ✓ Determine ways to recover from any type of loss including historical data, installation media, application files, configuration files, documents, and software licenses.
- ✓ Establish a strategy to keep the system up to date.
- ✓ Evaluate the set of data and application to restore to its previous state in the event of a disaster.
- ✓ Create a centralized inventory of all software titles and licenses, evaluate the possibility to replicate it in different locations.
- ✓ Provide procedures for performing full or incremental system backups and send copies of backup files to storage array networks off-site. The tenderer shall provide procedures for testing these backups as well.

19. SCADA-SAP Integration Requirement

KPC has a requirement to integrate the SCADA system with SAP for data processing. This also include pump-over nominations and described in these specifications.

19.1 ***Equipment Status***: - SCADA System monitors and records the pump run time in hours which then SAP monitors and raises maintenance notification once a certain no of hours is reached. SAP prefers to have OPC as a way of communication for Real Time integration of this data. ODBC will be acceptable if OPC is not an option.

19.2 ***Line Status*****: -** SCADA System shall record and pass the Pump Status information (Running / Stopped / Sequence / Tripped), Valve status information (open, transit, closed and fault) and flow meter readings to SAP. This Data together with other metrics in MII will be used to determine the line availability. SAP Prefers to have OPC Communication for getting Real-Time Line Status information. ODBC will be acceptable if OPC is not an option.

19.3 KPC SAP system connects to shop floor systems (Automated Tank Gauging Systems, SCADA, and Terminal Automation systems) for real time data via MII (Manufacturing Integration and Intelligence). MII supports OPC, ODBC, among others.

20. The versions of SAP & MII as currently installed:

- SAP: ECC 6.0, SYBASE Database system release 15.7.0.110
- MII: version 14.

21. Pump Runtime Data, Equipment/Line Status Requirement

The SCADA supplier shall provide Pump Runtime Data, Equipment Status and Line Status via OPC-DA. ODBC will be accepted as an option of last resort. The specific request and response parameters are shown in the table below:

N/N	Type	Communication Method	Business Process	SAP -> SCADA (Request Parameters)	SCADA -> SAP (Response Parameters)	Outbound Logic
1	SCADA OUTBOUND	OPC DA/ODBC	PUMP Runtime Data	Pump Name	Date Time	We need SCADA to monitor Pump Runtime in Hours. SAP needs this data in Real Time.
				Date Time	Pump Name	
					Pump Run Time in Hours	
2	SCADA OUTBOUND	OPC DA/ODBC	EQUIPMENT Status	Date Time	Date Time	We need Real time Equipment Data i.e. running, stopped, sequence, tripped for pumps and open, transit, closed or fault for valves.
				Pump Name	Pump Name	
					Pump Status	
					Pump Speed	
					Real Time Motor Power Consumption	
					Valve Status	
					Remarks	
3	SCADA OUTBOUND	OPC DA/ODBC	LINE Status	Line ID	ATG Data	We need SCADA to provide Real Timeline Information like what batches are currently on
					Batch Details (All the Batches and details in	

					the Line)	the line and its attributes such as size, position and product type, the current Flow Rate and Flow meter Reading.
					Products in the Line	
					Volume in the Line	
					Flow Rate per Station	
					Flow Meter Reading	
4	SCADA OUTBOUND	ODBC	Equipment Events	Time Duration	Time Stamp	We need SCADA to provide Alarm Events on Request from SAP.
					RTU	
					Point	
					Description	

22. Compatible Product Checking/Product Integrity

Bidder shall provide as a minimum the following product compatibility/integrity checking functions:

- ✓ Maintaining what product is in active and inactive piping, valves, pumps, tanks, manifolds.
- ✓ Product compatibility checking with features to aid in preventing product contamination,
- ✓ Monitoring effect of Controller actions for possible product contamination
- ✓ Monitoring field-initiated changes for possible product contamination.

SCADA SYSTEM – HARDWARE REQUIREMENTS

1 Nairobi Control Center SCADA Configuration

1.1. General

1.1.1 The pipelines shall have Optical Fiber Communication based telecom system, supervisory control, and data acquisition (SCADA) for reliable operation of pipeline for leak detection, batch scheduling and batch tracking.

1.1.2 The SCADA System Supplier shall be responsible for the design, manufacture, factory testing, packing, shipping, delivery, unpacking, and installation and commissioning of the following systems in the SCADA System Package:

- The SCADA system and other hardware.
- Application Modules.

1.1.3 The Contractor shall be responsible for ensuring all these systems interface correctly at a hardware and software level to each other and KPC's other equipment where necessary and as outlined in this specification.

1.1.4 The Nairobi Control Center shall comprise dual applications processors, dual communications processors, and peripherals interconnected by a Local Area Network (LAN).

1.1.5 The Contractor shall submit details for the design of the hardware configuration to meet all the specified requirements:

- Main SCADA functions as detailed under "SCADA Modules"
- Main Pipeline Management System functions as detailed under "PMS Application Modules"
- Historical Information System (Utility Data Warehouse)
- Communication and Data Acquisition Subsystem
- HMI

1.2.System Description

1.2.1 The prime function of the Master SCADA system is to provide safe and efficient operation of the pipeline and facilities with the minimum of manned intervention.

1.2.2 The pipeline will be monitored and controlled from control room at manned and supported by Nairobi Control Center Central SCADA System located at NCC. The basic design of the SCADA system shall be based on a 24 hour per day, 365 day per year operation from manned Nairobi control room. The system shall monitor the pipeline integrity and operations, communicating directly with all RTUs/PLCs. The Master shall have remote diagnostic capabilities for troubleshooting.

1.2.3 RTU's/PLCs are located at all remote sites as described herein. The availability for the entire SCADA communications system shall be 99.9% or better and shall be supported by the Supplier's calculations.

1.2.4 The SCADA system shall be capable of expansion to include future pump stations (at least 40% spare capacity), initially unmanned, but to be provided with the same monitoring and control capability and Man Machine Interface (MMI).

1.3.Location of Equipment

The exact location of the equipment in KPC Control building will be agreed upon prior to the installation.

1.4.Supplier's Own SCADA System

The SCADA system consisting of SCADA software must be the contractor's own product which is developed and maintained by himself and is not a product of any 3rd party. Any other proprietary software used shall be SCADA System manufacturer approved for use in his system.

1.5.Technical Requirement of Main Servers

1.5.1 The Contractor shall give full technical details of the configuration proposed and shall indicate the initial and ultimate capacities of the

equipment to be supplied. The capacity shall be adequate for the existing equipment as well as for future expansion. **The system shall be capable of expansion, Capacity to host more than 1 Million Points within single server.**

1.5.2 Nairobi Control Center will monitor the overall operation of the pipeline, advising the remote sites. The PLCs will carry out all monitoring of their individual local sites for everyday operation.

1.5.3 Nairobi Control Center shall incorporate dual redundant Ethernet LAN, distributed open-systems scalable architecture incorporating redundant processing systems and mass storage devices. The systems shall be based on the concepts of the Open Systems Interconnect (OSI) architecture maximizing the use of international standard interfaces. Each functional server shall have dual supplies, be redundant and connected to both systems LANs in a hot standby configuration.

1.5.4 The SCADA system servers shall provide the core SCADA functionality of:

a) Acquiring data from field instrument devices through RTUs/PLCs in remote sites.

b) Processing the field data to detect alarms and other significant process changes.

c) Providing the consistent databases of process information about the pipeline and facilities.

d) Presenting the data to the Operators via easy-to-understand graphical displays (2/3D graphical displays), alarms, trends, and reports, Rear Projection Displays etc.

e) Performing remote control of field devices.

f) Performing system monitoring and diagnostics to detect failure of hardware and/or software and take appropriate actions including remote diagnostic facilities for troubleshooting by system experts.

g) Historical archiving of data using NAS (Network Attached Storage) for recent and long-term historical storage.

h) Transfer real-time engineering data directly to and from the modelling system and Pipeline Application System (PAS).

i) Providing system data to the Management Information Systems.

j) Interface directly with other Product Reconciliation Systems within the supply chain.

k) Interface to third party devices.

l) Interfacing with RTU over the network using different protocols.

1.5.5 Communication and Data Acquisition Subsystem

1.5.5.1 The Communication and Data Acquisition Subsystem shall be redundant. Remote sites shall be accessed through polling of PLCs by the Nairobi Control Center.

1.5.5.2 The Contractor shall give full technical details of the configuration proposed and shall indicate the initial and ultimate capacities of the equipment tendered. The capacity shall be adequate for the existing equipment as well as for future expansion.

a) The control center shall be connected in a hierarchical configuration such, that in the event of a total catastrophe where Nairobi Control Center has failed or all the communications links are down, the PLCs will continue to monitor, protect their designated remote station of the pipeline. In such situations the remote station Operators shall be advised immediately and suitable alarms shall be raised, where applicable. Nairobi Control Center Operators shall also be able to use the voice conference facility to advise all remote station Operators immediately of such a failure.

b) Each PLC at remote site typically communicates with the central SCADA system using Modbus serial or TCPIP interface link at PLC Panel, Flow Computer, Fire Alarm Panel, Electrical sub-systems, and all other process/relevant parameters as required.

c) The electrical parameters and all other process/relevant parameters as required at Pumping Stations shall communicate to the Central

SCADA as either separate connections or as part of Modbus link connection.

1.5.6 PLCs/RTUs/DCS

1.5.6.1 PLC-based systems shall function as interfacing devices to interface with the local field instruments at each remote site. Both manned locations and unmanned locations (future manned stations) shall be considered.

a) There exists station PLC at remote sites, which communicate in bidirectional.

b) The existing communication protocols with station PLC are Modbus Serial and TCPIP.

1.5.6.2 The SCADA servers shall communicate with the remote devices using existing the fiber optic-based communication system.

1.5.6.3 Where possible, all PLCs/ remote devices shall be accessible from Nairobi Control Center Engineering Server remotely for carrying out maintenance activities without a need to physically visit the stations.

1.5.6.4 The Emerson Delta V DCS shall also be integrated into the SCADA system and all data logged and stored as per the specifications. The data types to be supported must include at least analog, digital, setpoints, rate etc.

1.5.7 Central System Local Area Network

1.5.7.1 The Local Area Network shall be based on hub technology with Ethernet BaseT allowing minimum speed of 1000Mbits/s. The system shall be redundant with two LAN connections per server, workstation etc. except for printers which may be connected to one LAN only. The LAN shall be equipped with Firewall properties, either in the hub switch itself or in a separate router. At least 40% extra ports shall be included to allow for expansion with office LAN etc.

1.5.7.2 The LAN shall have capabilities conforming to IEEE 802.3 LAN standards. The LAN switches shall include OSI Layer-3 features with IP routing. Quality of Service to the traffic and ensure that the network

traffic especially to remote workstations is classified & the congestion is avoided in the best possible manner.

1.5.7.3 Flexible conduit shall be provided over all interconnecting cables from LAN switches (redundant Ethernet switches at Nairobi Control Center, Ethernet switch for Web server at Nairobi Control Center, Ethernet switches for remote workstations) to respective equipment to provide mechanical strength and rodent protection. SCADA supplier shall include all the interconnecting cables and conduits.

1.5.8 Operator Workstations (MMI)

1.5.8.1 The Operator workstations (MMI) provided for the SCADA system shall support the Operator Interface and real-time system functions for the SCADA system and the man-machine interface functions when expanded to the ultimate size. The databases shall be field configurable and expandable without software redesign by KPC's programming personnel.

1.5.8.2 The AC power feed shall be from the UPS (230VAC), 50Hz.

1.5.8.3 Each Operator workstation (CPU box) shall support video adaptors with dual display ports but using only a single keyboard and pointing device.

1.5.8.4 At the Nairobi Control Center, two Operator positions shall be provided. Each position shall consist of one CPU box with the number of displays screens of viewable area.

1.5.8.5 It is preferred that all display units use flat panel technology to provide durable, low radiation, low power consumption and low heat dissipation operation. Display units shall be suitable for 24 x 7 x 365 operation.

1.5.8.6 Each workstation shall be supplied with a keyboard which has a minimum of 16 user configurable keys complete with LEDs.

1.5.8.7 Operator workstations shall be used to access the database of process information in the SCADA servers. Each Operator workstation shall be connected to both SCADA LANs and shall allow the user to interact

with the information in the SCADA system. Individual network cards shall be installed to connect to each LAN.

1.5.8.8 Personal computer (PC) based SCADA server shall not be acceptable.

1.5.8.9 The engineering workstation (EWS) shall perform database building display building and complete engineering configuration function. Additionally, all the function of SCADA Operator workstation/Man Machine Interface (MMI) shall also be available in SCADA engineering workstation. SCADA Supplier shall also provide one more license for all the software modules loaded in engineering workstation so that in case of EWS the engineering functions can be carried out from one of the SCADA Operator workstation/Man Machine Interface (MMI) by loading from available CDs.

1.5.8.10 All the Operator workstation/Man Machine Interface (MMI) shall be provided with pair of LCD/LED monitors with a single optical mouse navigable across both the monitors.

1.5.8.11 Each Operator's console shall be equipped with 2 or 3 graphic screens, 24" minimum, and it shall be based on latest compatible Windows. The console shall also include audible alarms. The Operator workstation shall function as the main interface for all SCADA system functions including:

- Graphical displays showing the process conditions of the pipeline
- Trends of selected process variables
- Alarm/Event management including alarm acknowledgement
- Commands and controls to change the operating state of the pipeline facilities such as opening or closing of valves
- Summaries and reports
- System maintenance and configuration changes
- Programming and system level access to the servers
- Pipeline Application Software displays
- Diagnostics of the system up to card level & Instrumentation including system-malfunction indications
- Tuning displays
- Sequencing guides

– All displays & MMI functions shall reside in each workstation and each one shall concurrently display images updated over the network to achieve a fast display response time.

1.5.9 WEB Based Man Machine Interface (MMI)

1.5.9.1 Nairobi Control Center SCADA shall provide a Web based MMI for the SCADA system. All Operator screen displays shall be accessible from the Web MMI.

1.5.9.2 The Web Based MMI shall be accessible using available Web browser.

1.5.9.3 The Web based MMI shall be accessible internally to the SCADA system communication network or externally via the SCADA system firewall.

1.5.9.4 The SCADA system shall be sized to ensure a minimum of 50 separate client Web MMI concurrent sessions shall be possible on Nairobi Control Center SCADA. The hardware & software provision shall be available for the KPC to access the bulk data base at the SCADA server end for their any other external application such as management information system (MIS). SCADA supplier shall take care of all the firewall and anti-virus protections.

1.5.9.5 Licenses for minimum 50 Web based MMI software programs shall be supplied.

1.5.10 Engineering Workstations

1.5.10.1 The SCADA system shall be equipped with an engineering workstation that can be used for performing system configuration/programming changes and testing these changes prior to implementing them on the live SCADA system servers.

1.5.10.2 The engineering workstation shall be identical to the Operator workstation hardware and shall consist of a single non-redundant RISC-based machine that is equipped with sufficient memory and disk for performing SCADA server functions & Operator workstation/Man Machine Interface (MMI) functions. Dual displays are required.

1.5.10.3 Each workstation shall be supplied with a keyboard which has a minimum of 16 user configurable keys complete with LEDs.

1.5.10.4 This system shall function as the main system test platform, a training workstation and as a backup Operator workstation.

1.5.10.5 As a minimum, the engineering workstation shall consist of:

- Multiple parallel CPU.
- Dual redundant power supplies, each fed form a different power circuit and from different sources.

1.5.10.6 The disk system shall be a separate standalone RAID disk array for the database, connected only to engineering workstation. Operating system and SCADA applications shall use a RAID (mirror disk).

1.5.10.7 Both disk systems shall have dual redundant power supplies and shall be sized to provide sufficient disk space to store all required program and data files while retaining a minimum of 100% spare unused capacity. A spare off-line emergency RAID 5 backup disk with the same configuration as the engineering workstation and loaded with all the system data shall be supplied.

1.5.10.8 The engineering workstation shall have backup software and hardware installed to allow weekly backups or as required of the complete system. It is preferred that the total system is backed up on to a single CD ROM disk or tape. If multiple backup media are required, then a ‘stacker” type hardware unit shall be supplied. The backup shall be:

- System image.
- System configuration tagging/mapping uploaded/exported in a format e.g. CSV file. This shall be downloadable/imported to system without having to reconstruct each graphic display.

1.5.10.9 System storage shall be based on a multi-ported RAID 5 disk array. The disk array shall be accessible by each of the redundant pairs of servers.

Interface between the RAID array and the servers shall be SCSI or preferably Fiber Channel.

1.5.10.10 Multiple, dedicated RAID controllers shall be provided to maximize system throughput and minimize Read/Write delays.

1.5.10.11 Disk drives that make up the RAID array shall be hot pluggable and replaceable on-line with no need to shut down the system or the RAID system. The system shall be capable of automatic recovery from a single disk drive failure.

1.5.10.12 The system software shall reside on a separate RAID 1 disk system.

1.5.10.13 Each disk array total capacity shall be expandable making a change in the system configuration and adding more drives, with no requirement to physically shutdown of the disk array and restart the system.

1.5.10.14 Power supply of the disk array shall be redundant with either power supply capable of providing power for the entire disk system. Similarly, any fans or other types of system cooling shall also be redundant in design. The system shall be provided with a simple to use graphical user interface for configuration and management.

1.5.10.15 The power system configuration and management function shall be accessible from any of the workstations on the SCADA network. The disk system shall include its own integrated tape backup and restoral system for performing tape backups of the system minimal support and resources from the SCADA servers.

1.5.10.16 The backup media shall use the most up-to-date high-capacity digital tape technology. The capacity of the selected tape shall be sufficient to perform a complete back up of the RAID array onto a single tape. If multiple backup media are required, then a ‘stacker” type hardware unit shall be supplied.

1.5.10.17 Data archiving of historical data of the SCADA system shall be provided by SCADA supplier. This shall include all applications configured under this tender.

1.5.10.18 A means shall be provided for data retrieval from the archived disks.

1.5.10.19 An efficient tool for the data conversion must be included.

1.5.11 Authentication Servers

1.5.11.1 The configuration should use a redundant pair of Microsoft Active Directory Domain Controllers to enforce the use of Kerberos and to centralize account management throughout the configuration. The authentication servers should use latest Windows Server operating system.

1.5.11.2 The operation of pipelines must be divided into geographical areas. The supervisor must have the full flexibility to select individual areas including single objects for inclusion into an operator's range of privileges.

1.5.11.3 The system shall contain an authority check to prevent unauthorized interventions in the Pipeline system. Unauthorized use of certain function has also to be prevented.

1.5.11.4 An authority function must be available which defines authority privileges and operating responsibilities for operators and other users. Characteristics of this authority function are:

- Prohibits unauthorized interventions at different levels: operations on the Pipeline system, data entry and presentation.
- Authority set-up: Provides the user with a flexible tool to assign the operator's privileges.

1.5.11.5 Authority assignment can be changed interactively with straightforward dialogs. An operator console can be used for different types of operator intervention: such as Pipeline system operation, maintenance activities,

Pipeline system planning or study functions. The authority configurations are tuned to the needs of every system installation.

1.5.11.6 The authority for a logged in operator can be changed both in terms of operations and in terms of objects.

1.5.11.7 All objects, that can be target for the authority checks, are subdivided into handy pieces in hierarchal structures called “Object Groups”. One group consists of either a collection of smaller groups or of a collection of objects. The subdivision of objects into groups is not restricted by any object relations. Object relations can on the other hand be used at creation of these groups.

1.5.11.8 The available operations shall consist of a set of basic operations and a set of application specific operations. Basic operations like picturing presentation, data entry, acknowledging, etc. are used in different applications. Access to certain functions or parts of certain functions can additionally be controlled via application specific operations.

1.5.11.9 It must be possible to define “Roles” which are based on a set of Operations and target Object Groups. The definition of “Roles” can only be performed by a person having the corresponding authorities.

1.5.11.10 Each individual operator is only authorized to use those roles the operator can use. When logged in, the operator automatically acquires the assigned Roles and Object Groups or obtains them by superior assignment actions.

1.5.11.11 A role can be applied on either any, or a specified set of operator workstations. In this way is it possible to restrict the authority for a certain workstation. A console can then be assigned a certain usage, such as maintenance, training etc. and only operators with the assigned roles may operate from this console.

1.5.11.12 During the entire work session, the operator identity must be recorded by the system whenever actions are taken.

1.5.11.13 Authority assignments can be changed on-line with an Authority Tool. This can only be performed by a person having the necessary authority for such intervention.

1.5.11.14 A built-in Authority Tool shall be available to perform all operations concerning authority. It shall be possible to:

- View which users that are logged in at what consoles.
- View the active roles for the logged in operators.
- View all active roles and what operators that got possession of the roles.
- Perform authority assignments like moving a role from one user to another granting a role or a part of a role from one to another operator.
- View all authority components like operator accounts, role definitions and authority groups.
- Perform maintenance like changing or defining operator accounts, role definitions and authority groups.

1.5.12 **Operator Login**

1.5.12.1 To be able to use an operator station, the operator must log in by entering a username and a password.

1.5.12.2 When logged in, the operator has the responsibilities given by the authority areas of the operator station and the personal authority areas depending on the definition of authority in the current system.

1.5.12.3 Login/Logout actions shall be logged in the event list together with the identification of the operator workstation and the operator's User's Identity (UID). During the entire work session, events generated due to important actions taken by the operator shall be marked with his UID.

1.5.13 **Printers**

The printers shall be connected to the LAN of the central computer system. They shall be accessible from all operator workstations.

1.5.13.1 *Laser printer*

The laser printer shall meet the latest standards and be designed for printing A4 and A3 formats.

1.5.13.2 *Color Hardcopy*

The color hardcopy printer shall meet the latest standards and be designed for printing A4 and A3.

1.5.14 **Time system**

1.5.14.1 The Time Synchronization system comprises an external clock as the source for the time base of the SCADA system, and the necessary interface equipment to synchronize the clocks in the application servers and the Data Acquisition Subsystem.

1.5.14.2 The Time system shall also accommodate the transition between the Standard Time (the internal time) and the Daylight-Saving Time.

1.5.15 **UPS**

The scope includes the supply a redundant floor-mount Uninterruptible Power Supply system.

a) The Contractor shall specify the required Capacity in his submission.

b) Typical specifications are as detailed in UPS section. However, Contractor is expected to supply a UPS that meets the power requirements for the SCADA and Associated systems and support existing load requirements at NCC with 30% future capacity.

1.5.16 **Pipeline Optimization**

1.5.16.1 *Power Management*

Integrated into the SCADA is the Power Management component. The Power Management component responsibilities are to calculate and manage the overall statistics for configured pumps like:

- No. of Start/Stops
- Peak Hour Statistics
- Volume vs. Period Statistics
- Efficiency at different head and flow values

1.5.16.2 *Pump Actions vs. Business Rules*

- Pump restrictions / performance
- Alarm notifications when operating outside defined limits.

1.5.16.3 *Drag Reducing Agent Management*

- Control fluency to optimize the required energy to pump the liquid products through the pipeline.
- Base amounts are specified with the product definition.

1.5.17 Manifold Management

1.5.17.1 *Flow Path manager*

a) The manifold Management component will support simple manifolds. It can handle multiple pipelines in, multiple tanks at a location and multiple pipelines out.

b) Each Batch in the PMS has a destination and sub destination. The destination is used to transport the product to the correct tank farm station and the sub destination is the tank within this tank farm station.

c) Based on the sub destination and the path configured, the flow path manager will send a request to the control system to open the correct path.

1.5.18 System Communication

1.5.18.1 *Process Communication*

The Process Communication System forms the communication interface to the network of PLC (PLCs). The required Functions are but not limited to:

a) Configuration and management of the PLC network
b) Industry-standard PLC communication protocols like Modbus
c) Redundant communication lines to the PLCs
d) Forwarding of control commands and set points from the operator workstations of the Pipeline system.
e) Cross-referencing of process data identities
f) Scaling of process variables to engineering units, both linearly and nonlinearly.

g) Redundant server configurations, with automatic switchover. Possibility to use distributed configurations.
h) Diagnostics and error reporting covering the Process Communication System itself, the communications network, and the PLCs.
i) Operator interface for maintenance and fault tracing

1.5.18.2 *Inter Center Communication*

a) Inter-Center Communication, for support of coordinated exchange of information among different systems within a hierarchical system and between relatively independent systems outside of the hierarchy, shall be included. Such communication may include links to external SCADA and PMS systems, and to accounting, billing, and management information systems (SAP).

b) The communication protocol for the exchange of data between different systems shall be Ethernet TCP.

2 SCADA Modules

2.1 System Software Features

2.1.1 *SCADA Displays*

a) The SCADA displays shall be subject to approval by KPC. The general arrangement of screen displays shall have active icons located at the top of the display. SCADA Supplier standard displays shall include but not be limited to logs and tabular displays only. The system architecture shall permit a far-reaching distribution of the functions to different servers. SCADA System shall be Web based System and the System shall be easily accessible through use of **web browsers** using appropriate credentials and assigned user access level.

b) The displays shall be with dynamic visualization of data, typically:

- Database summaries (analogue, status, etc.)
- System status summary
- Security audit log

- Communications summary
- Active alarm summary
- Event/alarm summary
- Disabled alarms
- Product Metering data and meter factors
- Pumping unit status and parameters
- Remote processor status
- System parameters
- Hourly reports
- Daily reports
- Monthly reports
- Pipeline product (oil) inventory report
- Tank volumes
- Pump-overs to oil marketers displays and controls.
- Pump-over nominations history
- Summation of received and delivered volumes for pipeline.
- Customer (Oil Marketers) delivery history
- Equipment faults history (by pump stations)
- Delivery volume reports graphics package
- Multiple trends (multi-pen, sliding window)
- Set point, process variables and controller outputs.
- Alarm deviation limits
- Loop modes (auto/manual)
- Algorithm types
- Alarm messages and device status
- Single loop displays.
- Real time plots of process variables with colour to indicate exceeding of pre-set limits.
- Alphanumeric tables listing loop parameters.
- Bar graph displays.
- Pipeline system sections and pump schematics with ability to zoom in to the details of individual sections of the system.

- Scratch pad notes for control Operators
- Real time trends with trend alarms reports:
- Delivery volumes and transferred volumes to downstream stations.
- Global pipeline system volume balancing report
- Customer (Shipper) product uptake report
- Global product inventory report with drill down capability
- Shift reports
- Special reports
- Equipment status report
- Alarm summary report
- Event and alarm logs
- Communication failure reports
- Devices due maintenance schedules/ reports
- Flow meter reconciliation report including storage of K factors to obtain meter drift.
- Control pop-ups (command to open and close valves, pumps etc.)
- PID controller pop-up (adjustments to PID controller parameters)
- Alarms
- Analogue measurements
- Power Meter readings
- Operator inputs
- Flow rates
- Pump speeds and vibration parameters
- Pipeline profiler (indicating head and tail of each batch)
- Batch tracking
- Leak detection
- Batch scheduling
- Gross and net metered volumes
- Daily, Weekly, month to date and monthly metered receipt and deliveries

- All PLC/RTUs status and those currently disabled
- All alarm units
- Daily closing inventory totals
- Meter factors at the flow rate, density, and date on which established.
- Delivery and receipt schedules
- System schematics **with expanded views** of the selected portions
- Communication failure reports, logs, and architecture.
- System diagnostic display down to card level on the RTUs and MS hardware. Self-diagnostic programs shall indicate device location, type, and malfunction.
- Equipment under maintenance banner/label
- Equipment down-time, MTTR & MTBR reports
- Equipment Maintenance counters/measurement points
- Equipment maintenance plans/strategy and notifications
- CCTV for pump monitoring display
- Oil Terminal/Depots Display
- Jetty – KPC facilities Displays

2.1.2 Project specific displays shall include overview and mimic displays of the overall pipeline system. Specific details shall include a detailed view of each major portion of the overall pipeline system.

2.1.3 Displays shall be provided to manage specific functions of the SCADA system such as leak detection, batch/pig tracking, batch scheduling, pipeline inventories and CP systems etc.

2.1.4 Displays shall be organized in a hierarchical structure starting from the overview displays and moving progressively downwards with increasing level of details.

2.1.5 Each display shall be linked to related displays such as adjacent facilities or a functionally similar system.

2.1.6 It shall be possible to maneuver upwards, downwards, and sideways in the hierarchical layers using simple pointer commands.

2.1.7 A mechanism using layered pull-down menus shall be provided to allow quick and direct access to any display in the system without a need to actual navigate through a series of intermediate displays.

2.1.8 In no case shall it be necessary to use a command line entry to bring up a display. All screen displays shall be identified by a unique name/serial number on the display.

2.2 Alarm Philosophy
Pipeline Alarm Management Requirements

Alarm shall be categorized and prioritized. The alarms shall be limited to Area of Responsibility (AOR). Alarms not in operator's AOR shall not be displayed as it may cause distraction. However, very critical alarms affecting entire KPC pipeline may be displayed.

2.2.1 Bidder's solution shall support the following alarm handling and management functions as a minimum while taking notice that the way alarms need to be handled by Company depends on a variety of factors, mostly determined by specific alarm procedures:

- Manual as well as automatic alarm acknowledgement where applicable.
- Conditional alarm suppression and delay function (for example while starting up a process)
- Inhibit and static/dynamic shelving functionality.
- Repeating not acknowledged alarms. Within a time limit a repeat can be set on these alarms.
- Alarm grouping. One 'overall' alarm represents this group. Acknowledging this alarm acknowledges the specified group. Resetting this alarm resets the group.

- First up alarming to identify the alarm that caused the first up alarm within a group of alarms.

2.2.2 First –out alarming for which the first alarm within a group suppresses successive alarms.

- Fast access to associated operational or pipeline management displays when the operator clicks on the specific alarm line. This makes the current display switch immediately to the display with the operational or pipeline management information associated to that alarm.
- Re-routing of alarms to another workstation if alarms are not acknowledged within a time limit.
- Re-routing of alarms after workday hours.
- Filtering of alarms coming from a particular area of interests (process area).
- Dynamic priority: priority changes when alarms last for a defined time or are not acknowledged within a defined time.

2.2.3 Acknowledgement of alarms shall be possible by the following methodologies:

- Manually acknowledge individual alarms from the current alarm overview by clicking on the particular alarm line
- Manually acknowledge a selected group of alarms in the current alarm overview at once (select and execute).
- Automatic (system) acknowledgement. The alarm (or alarm group) is automatically acknowledged. This feature is used to distinguish events or 'silent-alarms' from alarms.
- Process Acknowledgement. The value change of an item can be defined as the acknowledgement mechanism.

2.2.4 Alarm reporting constitutes one of the most critical man-machine communication issues and must be organized such that system abnormalities are presented in a clear, unambiguous, and convenient manner to the operating personnel.

2.2.5 The following general requirements are intended to ensure dependable and timely operation of the alarm subsystem:

- The system shall be able to hold at least 500 alarms in a FIFO buffer on disk for the Operator alarms screen MMI display.
- Displayed Alarm Summary shall prioritize alarms by time with the latest alarm at the top of the display.
- Repetitive reporting and logging of any single alarm condition shall not occur.
- The alarm subsystem software shall be designed to ensure that no system alarms are lost during normal or burst periods due to conditions such as internal buffer overflow.
- The capability to allow the Operator to inhibit the reporting of any alarm condition (device failures, communication failures, changes of status, etc.) shall be provided.
- The system shall be capable of alarming on all digital inputs, analogue inputs and calculated points in the system.
- Unacknowledged alarms shall be uniquely identified by flashing and colour on all summary, station schematic and tabular displays.
- In general, a return-to-normal condition shall be treated as an alarm condition.
- Nairobi Control Center software shall have capability for the RTUs to time stamp status changes to the nearest one millisecond and pass the time stamp to the SCADA system for display in the alarm displays and event summaries.
- Analogue and pulse input accumulators shall be time stamped to the nearest millisecond when scanned by the RTU.
- A minimum of 4 levels of alarming for prioritization purposes. The levels are emergency, high priority, normal priority, and low priority.
- The ability to link alarms to particular Operator consoles.

2.2.6 Printing of alarms as they occur only if selected from Operator command otherwise, they shall be sent to a file for viewing and printing by the Operator as required.

2.2.7 All alarms shall be stored on the servers in files. The Operator shall have the ability to review the alarm files and print out alarms individually or by page as required.

2.2.8 The system shall be able to store a minimum of 1 Gigabyte worth of alarms stored in files marked one for each day.

2.2.9 The alarm files when viewed by the Operator shall use a file name which clearly identifies the day and date for the alarms stored. The Operator shall be able to view reports and print selected ones as required.

2.2.10 *Alarm Sequence*

a) First out sequence for a group of alarms
The first out sequence shall be configured for high priority level and equipment protection related alarms and shall distinguish between the first and subsequent alarms in a group.

b) Normal sequence
The normal sequence shall be configured where first is not applicable.

2.2.11 *Alarm types*

a) As a minimum the following type of alarm conditions will be provided

- Absolute process alarms
- Deviation alarms
- High rate of change alarms
- System diagnostic alarms
- Field equipment limit/transducer limit alarms

b) The Contractor shall provide details of the instrumentation protective function analysis to determine that the number of alarms and trips in the system are kept to a minimum and how the alarm burst scenario is taken care off in the design.

2.2.12 *Alarm Annunciation*

When an alarm occurs, the Operators shall be alerted in several ways: An audible alarm shall be sounded.

- The alarm zone shall indicate the presence of the alarm. The alarm message shall appear in the Alarm Summary display.
- The alarm message shall be logged to the alarm and events buffers resident on hard disk and printed directly to the printer if configured.
- The point's identification on MMI displays shall flash if the alarm remains unacknowledged. Its colour (as appropriate) along with symbol or text shall indicate the new state.
- When acknowledged, the return-to-normal alarm message along with associated alarm messages shall be deleted from the alarm zone and the alarm display summary screens as appropriate. The alarm and the acknowledgment messages shall remain in the operational log file.
- A key shall be provided to access directly the alarm display Alarm Message Each alarm message shall contain the following:
  - ✓ Date and time of detection to the nearest one millisecond
  - ✓ Alarm priority indicator
  - ✓ Location name
  - ✓ Device ID (pump, valve, etc.)
  - ✓ Other information as necessary (such as the current value of a quantity, the associated limit and
  - ✓ the type of limit)
  - ✓ Alarm text (description of the condition, return-to-normal or acknowledgment)

2.2.13 *Alarm Zone and Banner*

On appropriate MMI displays, an alarm zone shall be provided displaying the number of unacknowledged alarms in the SCADA system. A separate alarm banner area shall display the two newest unacknowledged alarms of highest priority.

2.2.14 *Alarm Silence*

When the occurrence of one or more alarms causes the audible alarm at the console to sound, the Operator may silence the audible alarm through the alarm silence or alarm acknowledgment procedures. The silencing of an audible alarm shall apply to all alarm occurrences up to that point in time; the audible alarm shall not sound again until new alarms occur.

2.2.15 *Alarm Acknowledgment*

a) The acknowledgment of an alarm shall perform several functions.

b) It shall:

- Prevent the alarm message from appearing (or continuing to appear) in the new alarm zone of the MMI displays.
- Cause the symbols and messages associated with the alarm to stop flashing on all MMI displays upon which they appear.
- Cause the silencing of the audible alarm(s) when additional unacknowledged alarms exist.
- Cause an acknowledgment message to be logged for the alarm.

c) Alarms shall be acknowledged individually by selecting the symbol or message for the individual alarm (using cursor positioning). This technique shall be useable with schematic displays, tabular displays, and alarm summary displays.

2.2.16 *Alarm Inhibit*

a) Capability shall be provided to inhibit or override points from alarm processing.

b) When a point is inhibited, it shall continue to be entered into the database indicating its current value. The MMI displays shall also show the current value of inhibited points and provide a visual indication that the alarm processing of the point is inhibited.

c) The Operator inhibiting the point shall be logged, but further logging of any new alarm(s) for the point shall not occur until the point is enabled for alarm processing.

d) All alarm inhibited points shall be listed on an Inhibited Points Summary Display.

2.2.17 *Alarm Enable*

Capability shall be provided to reactivate inhibited alarm points for normal alarm processing. A message shall be logged indicating the alarm was enabled and the point shall be removed from the Alarm Inhibited Summary Display.

2.2.18 *Alarm Presentation*

a) Certain events shall be defined to be further processed as alarms. Alarms must be explicitly acknowledged and have more extensive presentation features than events.

b) Alarm conditions shall be presented as follows:

- Objects concerned are set to an unacknowledged alarm state and/or a persistent alarm state. Wherever presented on pictures, the symbols are highlighted.
- An alarm condition results in a message entry in appropriate alarm lists.
- The Alarm Icon indicates whether there are unacknowledged alarms or not. It is also used to control show/hide of the Alarm Window.
- Summary alarms representing several objects, for example a station, are highlighted on pictures.
- An alarm condition can result in audible annunciation.

c) Alarm List

- An alarm list shall be provided. The alarm list is a similar list to the event list but shall include only records of currently active alarms. Messages with different alarm status are distinguished by means of color and symbol.

- Lists are updated when an alarm condition is detected and when an alarm is acknowledged or deleted.
- As opposed to the event list, old alarm messages shall not be automatically deleted if the alarm list is filled. As alarms cannot be overlaid by new ones, new alarms cannot be added until space is made available. Space is made available by the alarm acknowledgement. An alarm shall however be generated before the list is completely full.
- The alarm list shall have the same possibility as the event list regarding sorting, searching, scrolling, colouring and making extracts.
- When an acknowledgement is executed for an object, the acknowledged status of all messages for the object will be deleted.
- If the object currently is in a persistent alarm state, the alarm message remains in the alarm list as acknowledged but with a persistent alarm status, otherwise the message shall be deleted from the list.
- Acknowledgement can also be made for a complete page by a single command.

d) Alarm Window

The following shall be provided for the Alarm window:

- For all operator stations, assigned to the application server, an Alarm Window shall be provided that is continuously updated to show the latest unacknowledged alarms with the most recent alarm on top.
- If there are more alarms than can be shown, this shall be indicated in the Alarm Window. The update shall be subject to authority considerations, that is, only operator stations that have authority (for 'Intervention') for the object are updated.
- When a burst of event arrives, the first alarm line is updated with the last alarm in the burst only rather than supporting a flickering line of non-readable text.

e) Acknowledgement of Alarm

An unacknowledged alarm can be acknowledged by an authorized operator from any operator station, which has authority for the associated object (for Intervention). This action can be performed from the alarm list.

f) An arbitrary picture

The alarm can be acknowledged from any picture which has the associated object represented, for instance, a single line diagram.

2.2.19 *Inhibiting of Alarm Processing*

a) It shall be possible to inhibit the alarm processing for an object.

b) Inhibiting of alarm processing shall be possible for:

- individual objects
- a complete bay
- a complete station

2.2.20 *Alarm and Event Management Software*

The Alarm and Event Management Software shall in general comply with the requirements specified herein as a minimum. The software is intended to be used for storing of alarms/events from SCADA/PLC/Other Control Systems and LDS. If the alarm and event management software is not integral part of SCADA system, then it shall be included as a part of scope of supply for SCADA system.

2.2.21 *Alarm and Event Management Software Functionality*

a) *Storage*

The alarm/event/log messages shall be stored for future accessibility on the FEP/database servers and the Historian server. Supplier shall specify storage capacity in terms of number of messages per channel. After the maximum limit of events is stored, the oldest messages shall be deleted on FIFO basis.

b) *Message Segregation/Search Report*

The software shall support segregation of the messages based on following:

- Type of Message, e.g., Alarm Messages; or Acknowledgement Messages, or Event Messages, Log report or by System etc.
- Time Slot: Type(s) of Messages within given time slot.
- Tag-wise: Messages for the given Tag or Group of Tags.
- Alarm Priority: Messages of the given priority type.
- Outstanding Alarms: Alarm Messages, which exist at a given time and not normalized.

c) *Frequency Analysis*

The software shall scan all the messages during the given time period and generate report giving frequency of each message with which it has occurred. It shall be available as a summary report during the given time.

d) *Remark Column Against Message*

The software shall support insertion of additional columns against messages for either automatic entering on predetermined text/value or manual remarks by reviewer.

e) *Log time*

The software shall support find time between specific messages.

f) *Data Export*

The software shall support data/analysis export to MS Office files as well as to another database such as Oracle, MS Access etc.

g) *Printing*

Though the software is intended to replace the alarm/event printer, the software result shall be printed on a network printer as desired or when a certain predefined message arrives.

h) *Backup*

The software shall support backup on removable storage media such as Write-able CD, hard drives, Optical Disks etc. The same

backup shall be retrieved whenever required. This shall make every message archival possible till the desired period irrespective of storage/licensed capacity.

i) *Reporting*

- Reports: Reports shall be available in MS Office files. Automatic Generation of e-mail on stated time shall be offered.
- Shift Report: This report shall be generated once every 8 hours. The report shall comprise of Frequency analysis and outstanding alarms.
- Day Report: This report shall be generated once a day at specified time. The report shall comprise of frequency analysis and statistical data of the outstanding alarms giving statistics based on priority, tag group etc.
- Reports on e-mail: The software shall trigger transmission of e-mail to predefined group of e-mail addresses. The trigger shall be provided by either of the following messages: Appearance of Particular Alarm/Event, Appearance of Periodic Production Report. The e-mail content shall be appeared alarm/event message or Production Report or attachment of report file in office format.

j) *Real Time and Historical Analysis*

The analysis tools and client software shall work on both Real time data and historical data.

k) *Control System Independent*

The software and hardware shall be independent of and separate from any control system.

2.2.22 *Data Processing, Reports & Logs*

a) Facilities shall be provided to process field data and shall include the following:
   - Incorporation into special application functions such as pump calculations

- Processing and arranging selected data for short, medium- and long-term storage and statistical purposes
- Arithmetic functions on selected measurements including sum and difference, mean values over different time intervals, interpolations, extrapolations, logical combinations, and predetermined formulae calculations. It shall be possible, in such calculations, to add or delete individual quantities and to specify quantities for new calculations
- Processing of selected measurements including derived measurements for trend monitoring purposes. It shall also be possible to retrieve historical measurements and derived measurements and present them on the MMI screens in trend form.

b) Reports shall be generated on Operator demand, at a specified time, or event driven.

c) The Operator Interface system shall provide the following reports and logs:

- System reports
- Operational log

d) System Reports
Shift, daily, weekly, and monthly system reports shall be provided. These reports will provide summaries of Pipeline operation and performance and shall include:
- Daily report showing energy consumption for each pump by the hour
- Operating mode summary including status of auto/manual and remote/local selections, Abnormal operating conditions, and limitations on pipeline capacity
- Trend data selected measured and calculated data trends, including maxima, minima and fifteen-minute averages
- Environmental report

e) Operational Log

This log shall store the following information in chronological order for a period of 30 days and have capacity for 3000 events in a FIFO buffer:

- Status changes
- Onset, acknowledgment, and clearance of all alarms Suppression and enabling of all alarms.
- Audit logging of individual Operator commands
- Trend records

f) This information will be stored as it is received with each item consisting of the date, time and description of the operation, event or alarm, and sufficient information to identify the equipment affected and the Operator identity involved.

g) A printout of this information will be available on request while the information is retained in the system.

2.3 Event Handling

Events shall be generated because of changes detected in the status of Pipeline system objects as well as in the control system.

2.3.1 *Event Activation*

Event processing shall initiate one or more of the following activities:

- Event record logged on printer
- Event record included in an event list
- Unacknowledged and persistent alarm
- Audible alarm
- Activation of secondary functions

2.3.2 *Delay Processing*

a) Multiple delay groups shall be defined for both measured values and indications, normally related to the type of device being monitored.

b) Typically, there may be a delay group for breakers, another for motor-controlled isolators, a third for manually operated isolators and so on.

c) A delay group shall specify a forced delay between the time when a transition of a measured value or indication is detected and the actual presentation of the event that is associated with the status change.

d) If the reverse transition of the measured value or indication occurs within the delay time, there is no event or alarm presentation for either transition.

e) Each delay group shall consist of a number of delay times, utilized for the different state transitions. One or more of these delay times may be set to zero; that is, no forced delay in presentation for state transitions.

2.3.3 *Event Lists*

a) Event lists shall be provided, the items shall be in chronologically order with a time stamp and a description.

b) At presentation, the list shall include events from the entire system, or it shall be limited to events from a part of the system, for instance a station.

c) A filtering feature shall limit the amount of information to what is relevant for the operator at each moment as it is automatically applied according to the currently selected system part or station.

d) Only events related to objects for which the operator has authority (authority for list presentation) are included, other events are suppressed.

e) In addition to the automatic filtering, a further reduction of the events to be included in the list can be requested by the operator by means of the “event extract” function.

f) The list can be limited to only include, events of a certain priority, events of a certain type, events for a dedicated object or a group of objects or combinations of these and other attributes.

g) A printout of the (extracted) event list maybe be manually requested or automatically initiated at pre-defined times.

h) When an event list is selected, the most recent events shall be presented on top of the page. The list shall be updated automatically real time with new events.

i) The SCADA system shall also include facilities for manually appending comments to events in an event list as well as long-term archiving of event lists using the historical database.

j) It shall be possible to sort the list by clicking on the header, i.e. sort the list on the event text.

k) It shall be possible to select one or more events and export the text to other applications, such as Excel etc.

l) It shall be possible to differentiate messages with different characteristics by background color or foreground color, text colour or all. For example, different priority levels shall be possible to show with different colors.

m) It shall be possible to scroll to see older events or search the list for events that match a search criteria or query string.

2.4 Historical Storage & Archiving

2.4.1 The SCADA system shall provide storage of archived selected data. Some data files will be held online as historical data. Selected data files shall also be archived to permanent storage.

2.4.2 The permanent storage medium used shall be on CD ROM disk or a tape system.

2.4.3 The design shall include full details of the historical storage and archiving system. This should include details of how the historical and archive data can be accessed by the SCADA system and other users. Details shall include:

- Server capability and redundancy
- Hard disk configuration
- Database structures and operating system
- Configurable data retention time
- Dead banding capability for analogue inputs
- Reduction group functions including compression and reduction of data, group average, group maximum and group minimum
- Event messages ODBC connectivity

2.4.4 *Historical Storage*

Historical storage shall be held online and shall be limited to the current day and the previous thirty-five days of data, arranged such that the previous data is always available for review. Data to be held in the historical log shall include:

- All status changes
- All calculated and real analogue data all alarms

2.4.5 *Archived Storage*

Archive storage of selected data will include but not necessarily be limited to the following:

- System Reports held in archive for 365 days (configurable).
- Monthly System Report, comprising a summary of the operations for the month.
- Analogue Point File, comprising selected analogue trend records stored and archived daily.

2.4.6 The archive system shall allow the transfer of archive data in at least text format to other computer-based systems and shall also allow hard copy printouts of archive data.

2.4.7 The archive system shall archive the required data files daily. The system shall verify the correct receipt of archive data.

2.4.8 If data cannot be archived satisfactorily the archive system shall generate an appropriate message and hold the data until the next archive period or until a manual archive command is initiated.

2.5 Engineering Facilities

2.5.1 The Operator Interface system shall include facilities for viewing all system data and displays, and for the creation and modification of the control system configuration, including the following:

- Boolean or logic changes to calculations
- Control algorithm configuration
- Display building
- Report generation
- Log generation
- Database changes
- Configuration off-line or on-line
- Alarm configuration
- High level language programming
- Communication and trouble shooting
- Field I/O data
- Server capability and redundancy
- Hard disk configuration
- Database structures and operating system
- Configurable data retention time
- ODBC connectivity

2.5.2 The system shall allow the Operator when selecting a field point on a display to view relevant data concerning the point. This shall include at

least the tag name, status, engineering value, instrument specifications, cause and effect details etc.

2.5.3 The engineering facilities shall include a system for generating and maintaining full documentation of the control system including all control logic and Operator interface configurations.

2.5.4 The engineering facilities shall be available on any one Operator station. All configuration data shall be saved to disk.

2.5.5 The Contractor shall include details of the engineering facilities offered.

2.6 System Security Requirements

2.6.1 The SCADA system shall be provided with a security/access management system to restrict access to authorized users only.

2.6.2 The security/access management shall apply to all SCADA workstations, SCADA servers and Web based terminal access sessions.

2.6.3 Multiple access levels shall be provided to allow differentiation of privileges for the following as a minimum:

- Casual user (view only)
- Maintenance and support staff (can make changes to SCADA database).
- System supervisor (have access to program files and can make system level changes)
- The engineering workstation shall be equipped with full-fledged graphic editor.

2.6.4 The RTU/PLC stations shall only allow remote control commands to be enabled over the individual RTU/PLC control region by manually passing the command control to the Central SCADA system for authentication.

2.7 Polling, Call up and Time Update

2.7.1 The poll time considering all PAS analogue parameters changes and 20% AI & DI parameters changes every poll of all RTUs including the time for scanning, polling, processing, and complete update on database shall not exceed 5 seconds.

2.7.2 SCADA-LDS interface data interchange, including real time model, leak detection, batch tracking and supplementary modules and update on database shall be completed every 5 seconds.

2.7.3 The Application system including leak detection, batch scheduling and batch tracking and supplementary modules shall be implemented without any loss of functionality and performance in case of failure of link/channel SCADA server switchover, communication switchover. SCADA Supplier/Application supplier shall ensure the same.

2.7.4 Call up time of any graphic display on colour MMI of Nairobi Control Center SCADA shall not exceed 5 seconds.

2.7.5 Update time of any graphic display on colour MMI of Nairobi Control Center SCADA (after database update) shall not exceed 5 seconds.

2.7.6 Call up and update time (after database update) of any graphic display on colour MMI of remote workstation shall not exceed 15 seconds.

2.7.7 Operator commands shall be prioritized and shall be outputted from the RTUs/PLCs within 5 seconds of initiation at the Operator workstation/Man Machine Interface (MMI).

2.8 Audit Logging of Commands

2.8.1 The Web based terminal, MS and Remote sites Operator logon sessions shall be logged in the operational log to track the controls and actions taken by individual Operators.

2.8.2 The system shall all provide the ability to log engineering changes with details of activities for tacking of all system related changes.

2.8.3 The log shall be stored electronically on disk and be accessible by the system supervisor logon permission only.

2.8.4 The entries within the log shall contain as a minimum the date and time of commands, the command executed, the point number database reference number and the name and identity number of the Operator.

2.8.5 The date and time of Operator and all other users' logon and logoff shall also be recorded in the log.

2.8.6 The audit log shall be viewable by the supervisor and able to be printed.

2.9 Emergency Shutdown from SCADA, ESD Console and Field

2.9.1 As one of the safety measures to safeguard pipeline operations, SCADA System MMI workstation shall be configured to have "Total Pipeline ESD" command activation and additionally SCADA system MMI shall also be configured to have emergency shutdown command activation in form of "ESD" soft keys for all designated station. "ESD reset" soft keys for "Total Pipeline ESD" and for all stations shall be configured in SCADA System MMI accordingly.

2.9.2 As a separate safety measures, field ESD pushbuttons are provided in the associated manned stations to initiate emergency shutdown from plant area such as pump stations and areas as applicable.

2.9.3 Contacts of ESD pushbuttons, meant for emergency shutdown of all electrical main incomers, are directly wired to electrical panels (without routing through PLC or SCADA RTU). In other stations, ESD pushbuttons are routed through PLC or SCADA RTU for generating alarm on SCADA System.

2.9.4 "Total Pipeline ESD" once activated from Nairobi Control Center SCADA shall initiate emergency stop of station pumps, station isolation valve in logical sequence as defined in the PLC stations. In principle, receiving station(s) at extreme end shall isolate the station first starting with closure of the Motor Operated Valve(s) on feed to the tank farm or pumping station followed by closure of station inlet valve.

2.9.5 It shall subsequently initiate emergency stop of rotating equipment (pump set) at intermediate pumping stations and then closure of station isolation valves starting from next extreme end station and ending with initiation of emergency stop of rotating equipment at dispatch station and then closure of the station isolation valves at dispatch station.

2.9.6 Detailed control and automation philosophy will be issued to Contractor during the contract execution which will include detail descriptions of interlocks and start/stop sequence of various process facilities being implemented under this project."

2.10 Enhancement of Pipeline Safety through SCADA

2.10.1 To facilitate the Pipeline Operators to respond to emergencies in pipeline due to abrupt closure of any automated valve at manned, or unmanned stations, "Pipeline Emergency Bit" shall be incorporated in SCADA system. The Pipeline Emergency bit shall provide round the clock monitoring of pipeline.

2.10.2 The SCADA pipeline Emergency graphics shall be configured in SCADA System on MMI to facilitate continuous monitoring of entire pipeline. Any emergency in pipeline shall raise audible alarm for Pipeline Operators.

2.10.3 SCADA pipeline emergency graphics shall have provision of manual entry/forcing emergency status when a given station automated valve(s) has been reported failed/malfunctioned or when given station automated valve(s) is closed due to power failure/UPS failure. Manual entering and/or forcing emergency status shall only be possible in "Engineer sessions" of SCADA System.

2.10.4 Required logic interlocks shall be developed in SCADA System/ Station PLC/RTU as applicable.

2.11 Failover Philosophy

2.11.1 The SCADA System shall incorporate dual redundant Ethernet LAN, distributed open-systems architecture incorporating redundant processing systems and mass storage devices.

2.11.2 The systems will be based on the concepts of the Open Systems Interconnect (OSI) architecture maximizing the use of international standard interfaces.

2.11.3 Each functional server shall be 1+1 redundant and connected to both system LANs in a hot standby configuration. All the nodes on the dual LAN and all the RTUs shall be synchronized to master clock.

2.11.4 The SCADA controls shall be connected in a hierarchical configuration such, that in the event of a total catastrophe where both the SCADA system have failed and/or all the communications links are down the RTUs/PLCs will continue to monitor their designated section of the pipeline.

2.11.5 This will provide up to four levels of availability. Under the SCADA System configuration both Primary and Secondary SCADA shall have an up-to-date copy of the database even though there is only one master at any given time.

2.11.6 Under normal operations the pipeline Operators at SCADA System shall have access to the entire pipeline database including that of the individual RTUs.

2.11.7 In the case of Nairobi Control Center, one of the servers will be designated as the online device and the other server will be designated as the standby device.

2.11.8 The standby server shall actively monitor all system activities and shall maintain a complete up-to date copy of the database. A hardware or software failure of the online server shall automatically cause fail over to the backup server. Data synchronization between the two control centers shall ensure accurate and up-to-date database replication.

2.12 Line Balance

Bidder shall provide capabilities to calculate both simple line balance (meter in vs. meter out) and compensated line balance which takes into account temperature, pressure, fluid properties, bulk modulus, density, or viscosity, etc. effect on the line fill. Bidder's solution shall include the following principles and features:

- ✓ Non-linear and/or linear temperature profile,
- ✓ Non-linear and/or linear pressure profile,
- ✓ Taking batch tracking information into account for compensated line balance
- ✓ Number of observation periods and durations with different alarm thresholds,
- ✓ Diagnostic tool for use by Controllers to help troubleshoot possible data and instrumentation problems contributing to the indication of a possible leak,
- ✓ Dynamic alarm threshold adjustment
- ✓ Enabling/disabling line balance alarms for specific segments, meters and/or observation periods,
- ✓ Statistical or signature analysis tools, or similar, operating on over/short results,
- ✓ Voting scheme to determine if an alarm should be issued,
- ✓ Alarm limits expressed as percent of flow rate and/or absolute values

2.13 Facility Balance

Bidder's solution shall facilitate the following balance and related leak detection capabilities:

- ✓ Ability to provide line balance type functionality for pipeline facilities such as tank farms, truck loading, etc., and
- ✓ Ability to provide line balance type functionality for regions including both facilities and pipeline segments.

2.14 Maximum Allowable Operating Pressure (MAOP) Alarming and Hydraulic Profiles

Bidder shall support MAOP alarming and hydraulic profile capabilities. It shall be possible to display MAOP in an X-Y plot and generating HH, HI, LO, LL pressure alarms based on calculated hydraulic gradient and the MAOP.

2.15 Pig Tracking

Bidder shall provide the following pig tracking capabilities as a minimum:

- ✓ Tracking pig locations using a unique icon on displays,
- ✓ Allow controller or support staff to modify pig location (including effect on batch tracking and line fill volumes on liquid lines)
- ✓ Configurable alarms triggered before a pig arrival at each location plus ability to inhibit for specified locations.

2.16 Inventory Analysis Module

a) The module shall generate current pipeline inventory information accounting for variations in line packs based on pressure, temperature and density profiles.

b) Line pack shall be considered as the difference in pipeline inventory between standard conditions and operating conditions, accounting for fluid compression and pipe wall expansion.

c) The basis for the calculations shall be the profiles determined from the real time dynamic model and available measurements.

d) The inventory analysis module shall compare inventories and packing rates against maximum allowable and minimum allowable limits and alarms any limit violations, to facilitate the dispatcher in responding to changes in supply and demand.

e) The system should also have an overall accounting/inventory module to verify total pipeline throughput on a daily and monthly basis.

f) The Automatic Tank Gauging system volumes, Dump Tanks, slopes, pipeline pack and any other product within KPC systems shall be captured in the inventory module.

Quick reports tools MUST be included in this module to mine data from system for dashboard reports, detailed reports, and any other planning reports for KPC use.

Reports for each Depot's operations will also be included.

2.17 Pipeline Transportation Efficiency

Pipeline efficiency module shall calculate pipeline efficiency value for each of the pipeline's sections monitored by Real Time dynamic model, by comparing actual frictional losses against clean pipe losses, to help the dispatcher to determine when the Pig should be run in that pipeline section to improve pipeline operation. Low pipeline efficiency alarms shall be generated.

2.18 Pipeline integrity (overpressure/under pressure analysis) function

The modelled pressure profiles shall be superimposed on the maximum allowable operating pressures and minimum allowable operating pressures (as required) for the pipelines and through the integrity monitoring function, the modelled profiles shall be compared with these allowable operating pressure limits to initiate alarms to the OPERATOR indicating the locations of possible overpressure/under pressure conditions, to enable him to initiate the corrective actions.

2.19 Pressure, flow, temperature & property profiles

The profiles of Pressure, flow, temperature, density, etc. shall be made available to provide additional information to OPERATOR.

2.20 Instrument monitoring function with drift analysis & maintenance scheduling

a) The instrument monitoring function shall monitor the performance of instruments used in leak detection and detects their deviations from normal operating parameters and thereafter prepares maintenance schedule identifying the instruments, which have been drifted to facilitate improving the pipeline operations.

b) The Instrument drift analysis shall cover Pressure, Temperature & Flow rate at boundary measurements and Pressure & Temperature.

c) Maintenance schedules will be prepared, one corrective schedule will be annunciated by the software identifying the instruments with tag nos., which have drifted, and another maintenance schedule will be prepared by the software identifying the instruments with tag nos. for which periodic scheduled maintenance is due.

2.21 Pig tracking function

a) Pig tracking shall track the functions of launching, tracking & recovery of Pig in the pipeline.

b) Launching of Pig shall be done automatically upon receipt of a signal from the scraper launch site and scraper shall be removed upon receipt of a signal from the scraper receiver site.

c) Pig tracking shall calculate the positions and movements of scrapers in the pipeline system and estimates arrival time for each Pig at its receiver, to facilitate the Operator for monitoring and scheduling operations.

d) The calculations shall be based on pig speed computed using the model calculated fluid velocities along the projected path of pig, duly compensated by the slippage factor (configurable) for each pig.

e) The module shall permit tracking of multiple Pigs simultaneously and revision to pigs' arrival time and position after the pig launching.

2.22 Product Scheduling and Batch Tracking

a) Product scheduling shall be done from SCADA system scheduling and batching module.

b) KPC batching cycle checks the pumping process, ullage, innage and the expected ship capacity.

2.22.1 Current Scheduling Process

✓ Manual dips on all tanks at PS09, PS10, PS12, PS25, PS27, PS28, KOSF (PS14) and Kenya Petroleum and Refinery Limited (KPRL) are obtained every Midnight and entered in SAP System. The status of pipelines (i.e., Line 1, 2, 3, 4, 5 & 6) is also picked with current flow rates. Status in this case mean if Line is Running or Offline.

- ✓ The levels are obtained from SAP by Scheduling personnel and entered in an Excel sheet to compute the Ullage in KPC system.

- ✓ Using this information and by keying in projected flow rates in the Excel Sheet, the pipeline schedule is determined with projections on product evacuations (in m^3) to determine if new stocks are required to be shipped, or if the ship capacity can be accommodated in event it docks at Jetty in Mombasa.

- ✓ From Innage, the Excel sheet computation shows the pumpable volumes from KOSF or KPRL to other stations like PS09, PS10, PS12 or into Petrocity. It also shows pumpable volume from PS10 to PS25, PS27 and PS28. Petrocity is a 3rd Party Depot that lifts products from Line I/V branch-off(s) at PS8.

2.22.2 **Batch & Pipeline Scheduling**

- ✓ Once the pumpable and Ullage is determined, the scheduling is done to pump batch(es) of a given product. Each batch is given a tacking number from source to the destination. The batch shall have the following details:

  1. Source depot
  2. Batch ID
  3. Credentials of batch creator
  4. Product Grade
  5. Batch Volume
  6. Destination
  7. Estimated Time of Arrival

- ✓ The batch may be split into a pipeline branch-off depending on need and schedule.

Required

- ✓ In this SCADA upgrade, the system shall be integrated to ATG system and be scheduled to take snapshot levels of all ATG systems in KPC and KPRL and report the Ullage and Innage in system. The system shall also check for product requests to Petrocity as part of Ullage from

SAP system. This Petrocity batch may be split into several OMCs as sub-batches. The sub-batches need to sum up to original batch with traceability record which may be queried by any of sub-batch or original batch with all details of splits.
This shall form basis for batching and scheduling.

- ✓ The ullage (and Innage) shall be computed in all depots in Realtime.
- ✓ The integration of ATG and SAP to SCADA is in contractor's scope.
- ✓ A field to enter the expected ship capacity shall be availed to make it possible for scheduling computation.
- ✓ The ATG snapshot of all tanks and Lines Flowrates automatically be carried out at every midnight and Ullage determined. Some of the fields that shall be availed in midnight report shall include:
    - Tank Tag Number
    - Product ID
    - Total Depot Capacity
    - Depot Working Capacity
    - Depot Net Volume
    - Depot Dead Stock
    - Tank Net Capacities per depot
    - A summarised report for all the depots.
- ✓ By click of a button, the final schedule shall be availed in PDF in form of a report for sending to pipeline operators. It shall also be possible to send schedule on email to group or individual KPC staff.
- ✓ The pipeline Scheduler shall be able to input Line Batch schedules in the system which should be available in the system as a queue for controller to execute. Any splitting of Batch shall be possible. The batch splits shall be summed and tagged to original batch number and be possible to be called into report should any of the split or original batch numbers be invoked into report.

- ✓ Once batch movement is completed, the system shall archive the information of original batch number, destination, splits, and all relevant information regarding the batch.

2.22.3 **Batch Queuing**

The system shall have a queuing capability of batches. Towards end of active batch, say at 95%, the system shall alert operator to be ready for lining up for next batch. This shall be in form of a popup which when acknowledged the system shall have a countdown in hours /minutes remaining to complete the active batch.

2.22.4 **Batch Tracking**

- ✓ It is in contractor's scope to supply non-intrusive density meters in Line IV & V stations. The contractor shall be required to supply, install, test and commission the densitometers for accurate batch tracking purpose.

- ✓ A density profile shall be possible in form of a trend. This shall be through a popup page or screen display that up to 20 trend pens can be added on same page. The sampling rate shall be as high as possible to give smooth and finer trend profile.

- ✓ Using the batch head and tail, the system shall report the Estimated Time of Arrival (ETA) and Estimated Time of Completion of the batch receipts at its destination. The system shall automatically adjust these times from time to time to ensure accuracy of the information.

- ✓ It shall be possible to carry interface management using Densitometer trends and Manifold management system.

2.22.5 ***Batch Tracking Other Details***

Batch tracking shall provide as a minimum the functions and information to enable operator with the ability to:

- ✓ adjust batch tracking to match field conditions,

- ✓ calculating the estimated time future batches will be launched assuming the current flow rate is maintained,

- ✓ display launch and arrival times for batches if the flow rate is changed to some hypothetical value,

- ✓ calculate the amount of transfer mix (interface) generated by different adjacent product batches and add it to the up – or downstream batch.

- ✓ consider scheduled changes in the flow rate when calculating estimated launch and arrival times,

- ✓ undo, or revert to saved state, function for operator or support staff edits to batch tracking data (including how all related functionality and applications will sync up to the restored batch tracking data),

- ✓ configure alarms triggered before a batch arrival based on remaining volume and/or time plus ability to inhibit these alarms for some locations per batch,

- ✓ display batch tracking time values as time-of-day,

- ✓ saving a batch tracking line fill on demand, and/or automatically on a periodic basis, with ability to revert to this line fill manually if desired and editing line fill and other batch tracking information.

Four different statuses must be clearly identifiable:

- ✓ **Scheduled**: the batch is imported in the system, but it has not entered the pipeline
- ✓ **Active**: the batch has entered the pipeline partially or entirely and it is being moved
- ✓ **Finished**: the batch has been delivered
- ✓ **Inactive**: the batch is split or merged into another batch

2.22.6 *Batch Scheduling Other details*

- ✓ Batch scheduling function shall be carried out for different grades of refined petroleum supplies.

- ✓ For product launch (at dispatch terminals)/receipt/interface detection, the product density/operator manual inputs/flow meter data/the open/close status of manifold valves at the dispatch terminals and

pipeline receipt terminals shall also be used as finalized during detailed engineering phase of the project for Batch scheduling & tracking.

- ✓ The monitoring/withdrawal (Interface cutting) of the product batches shall be based on composite signals of density variation (interface alarm), operator defined schedule, flow measurements, manifold valve's (MOV's) open/close status at the dispatch terminals and pipeline receipt terminals (The methodology for Batch scheduling from various dispatch terminals and for monitoring the product batches using any of the above signals shall be finalized during detailed engineering designs).

- ✓ Batch scheduling and tracking module shall be implemented such that there is no loss of functionality and performance in case of failure of link or during SCADA Server switchover, communication failover. SCADA supplier/ LDS supplier shall ensure the same.

- ✓ Other Batch Scheduling Function

  a) The batch scheduling function shall monitor the actual dispatch of product batches and shall compare it to the schedule of product batches.

  b) The pipeline operator inputs details of products to be transferred from dispatch terminals through the pipeline into a schedule. The schedule includes the product type, volume to be transferred, batch density, injection & destination locations and assigns a unique batch identifier number. The batch identifier number shall be defined in such a way that it shall have the product identification, which shall be used in the entire/relevant batch tracking displays & alarm/event messages to identify the batch & corresponding product.

  c) Product batch schedules shall be changeable by pipeline operator prior to start of the batch i.e. deletion of any scheduled batch/changes in the batch schedule data, rearrangement of batches due to last minute changes shall be possible. All activities of such changes shall be logged and archived/stored in system.

- ✓ Additional Batch Tracking Functions

  a) Update the position of the batch fronts (to be determined from the velocity profile) generated by transient model. The position shall be further adjusted by the density data.

  b) Batch tracking module shall track the density variation down the pipeline and would show the position and characteristic of batches in the pipeline.

  c) This module shall track the interface between various product batches and the extent of mixing done as a function of time, as the interface moves down the pipeline. For each interface, quantity along with interface position to be shown in conjunction with the base products in the pipeline.

  d) In addition, batch-tracking module shall monitor whether the actual batch transportation is taking place in accordance with batch schedule inputted by operator.

  e) The batch graphic displays on the Application GUI shall provide the overview of the different batches currently found in the pipeline and their movement (identified by colours) as well as expected arrival times at Receipt terminals. The batch graphic display shall include batch ID, dispatch time, batch volume in the pipeline, schedule volume, batch position, batch length, batch volume received, expected arrival time, actual arrival time for each pipeline section.

  f) Actual arrival time for each pipeline section shall not be displayed momentarily but shall be available in the system for reference at later point of time also.

  g) The batch graphic display shall show the position of each product batch and interface in the pipeline along the pipeline distance with colour of the batch indicating the product contained in the batch. Different colours for each product will be shown.

h) The software shall maintain a queue of all batches scheduled to pass through the flow meter in the system and shall identify the start of a new batch in the pipeline and generate an event for the same. The batch dispatch date and time and interface dispatch date and time shall be based on density signal.

2.23 Batch Switching

a) Actual switching will be determined by densitometer indications and manifold valve stations changeover, line displacement volumes and custody transfer meter readings. At each of the Terminals, a densitometer will be installed to indicate the density of product.

b) Changing density trace. The actual interface will also be traced by the SCADA and the remote units will alert the Operator of the interface position. This will allow the Operator to evaluate when valve switching must take place.

c) At the end Terminal the interface will arrive and by predetermination part or all the co-mingled products can be taken into final tankage to reduce double handling through interface tanks. If this is not done the receipt needs to be circulated to even out the blend. The site chemist will analyze the product and expected interface to ensure optimum blend and to ensure the product remains on specification. The Operator will be able to cut the interface at a particular volume point based on the system reporting tank capacity, product quality, the amount of interface volume and the allowable contamination limits.

d) The flying switch at the Terminal batch manifold is accomplished by opening the valve for the new batch whilst simultaneously closing the valve for the preceding batch. Automatic valve sequencing is predetermined and sequenced by the SCADA system and its associated RTU/PLC logic systems requiring minimal Operator interaction.

2.24 API Correction Factor Table

The SCADA system shall employ product correction factors derived from current published American Petroleum Institute (API) – Chapter 11.1,

including:

- ✓ Volume 27: 11.1.7.2 **(Table 59B)** Refined Products
- ✓ Volume 28: 11.1.7.1 **(Table 60B)** Refined Products

2.25 Pressure Flow Control

a) Pressure flow control logic shall provide the means of monitoring and controlling the efficient pipeline operation to optimum pressure and flow levels to within tolerances necessary for other pipeline functions to be possible.

b) Other logic modules shall provide set point levels for the pressure/flow control module to operate. The Pressure/Flow Control logic modules shall monitor and control as a minimum, the line pressure, meter run flow and set point values, the control method status (manual, automatic), all PID and logic algorithm configuration data values, and plant fault, error and emergency shutdown conditions and interlocks. Some of the logic controls for flow may be in place using PLCs and hence the SCADA/LDS vendor may enquire on details on case-by-case basis.

2.26 Other Batch management functions for inclusion:

a) Line Fill
b) Anomaly Tracking
   - Interface Management
   - Pig Tracking
c) Ticketing

2.27 SCADA/LDS Interface

2.27.1 Common Pipeline Configuration

The bidder's pipeline management applications should plug into the same platform as their SCADA system functions to manage the pipeline from an operations point of view. This shall result in:

- ✓ Same layout of pipeline displays shall be used for process displays.
- ✓ Same user authorization is used within the whole application.
- ✓ Standard features like reporting, history and configuration are

available in the same environment.

Thus, bidder's solution shall provide a single location for maintenance of the pipeline configuration required for data acquisition, supervisory control, data processing, alarm/event processing, advanced liquid applications, and pipeline monitoring. This feature will integrate basic SCADA configuration with pipeline characteristics. Pipeline characteristics shall include:

- ✓ Pipe length, diameter, and wall thickness,
- ✓ MAOP,
- ✓ Field device and instrument locations,
- ✓ Elevation profile,
- ✓ Fluid properties for all fluids transported.
- ✓ Pipeline topography (i.e., the arrangements in which the pipeline segments, pumps, valves (and types), instruments, etc., are connected or attached to each other).

The pipeline management application configurator shall contain the following standardized component objects and templates to instantly configure the complete pipeline infrastructure:

- Pipeline
- Pipeline topology
  - ✓ Segments
  - ✓ Pipeline properties

- Profiles
  - ✓ MAOP profiles
  - ✓ Temperature profiles
- Sites
  - ✓ Stations
    - Meter Runs
    - pumps
    - Storage or tank farm
    - manifold
    - Inlets / outlets
  - ✓ Locations

- Pressure / Temperature measurements

- Line pack
- Flow paths
- DRA products
- Product definitions
- Batch
  - ✓ Scheduling
  - ✓ Tracking
  - ✓ Ticketing

From this configuration, an application can extract the following information:

- A list of pipeline systems,
- A list of segments on a system,
- Connectivity of the segments,
- Pipe characteristics for a segment,
- Stations on a segment, including location, elevation, RTU/PLCs, etc.,
- Devices and instruments at a location, including their characteristics
- The relationships of the devices and instruments, such as which pressures are associated with a pump, or which valves are associated with a tank.

Any data for which this repository is not the system of record should be able to be easily updated from the system of record periodically.

2.27.2 SCADA/LDS interface shall be latest, field proven and based on industry protocols. SCADA/LDS interface shall fulfil the following requirements:

a) The interface shall transfer data with time stamping & status information between SCADA & LDS and match data quality flags and codes, match data interchange transfer intervals/frequencies, match execution cycles and prioritization of Application modules to achieve the desired performance.

b) Further interface shall accept all types of data including real and integer values between SCADA & LDS in both directions.

c) Time synchronization of LDS Server with SCADA Servers. RTUs/PLCs time stamped data shall be used for SCADA and LDS database.

d) The interface to take care of continuous uninterrupted execution of LDS in case of switchover of active SCADA Server to standby SCADA server, LAN switchover, switchover of channels, link/channel failure/communication switchover without any loss of performance & functionality.

e) The interface shall properly handle data confidence attributes/data quality tags, perform operational checks (e.g., to ignore transmitter values which gets isolated at a result of valve closure), LDS software health status flags etc. to enhance the reliability of LDS execution.

f) The interface shall have enhanced bandwidth to permit all data changes (no filter to be used) to be transferred between SCADA & LDS within the time required for the execution of real time model.

g) The Application shall continue to operate in the event of degraded inputs and have the facility for handling the reduced quality, outside the range data, bad data for number of scans by downgrading the status of data items and replacing with preset, last good values or calculated values as necessary.

h) LDS system to take care of automatic back-up of memory resident database every 10 minutes interval (configurable). In order to take care of situation wherein there is a possibility of data corruption in the saved file due to abrupt termination of LDS processes (say on account of abrupt disconnection of power to LDS server) suitable mechanism shall be implemented to enable recovery of Application database from earlier revision of saved file.

2.27.3 The critical LDS execution results as indicated below shall be transferred from LDS Application to SCADA & built as a part of SCADA database for display in the integrated MMI for the purpose of integrated alarms/events trending and archiving:

- Leak status (confirmed leak detection with leak sizing & leak date & time, leak
- Location
- Pipeline efficiency alarms
- Energy consumption data (if not already in SCADA application)
- Pipeline inventory values
- All the batch tracking alarms/events
- Pig tracking events
- Pipeline integrity alarms
- Instrument drifts with alarms and events
- LDS modules execution status

2.28 Application MMI

2.28.1 Anomaly Tracking

Bidder shall provide as a minimum the following anomaly tracking capability:

- Tracking any identifiable interfaces and/or anomalies and represent them on batch tracking displays.
- Applying a slip factor to maintain an accurate account of the real-time position.
- Tracking multiple anomalies and/or interfaces per pipeline segment
- Provide separate Controller notes for information regarding each anomaly,
- Automatically creating an anomaly to track based on a status change.
- Configurable alarms triggered before an anomaly arrival at each location plus ability to inhibit for some locations per anomaly.

2.28.2 The Application supplier shall provide his own easy-to-use Application MMI having user-friendly standard displays, which shall be fully integrated with the LDS system to provide the purchaser benefits of ease of operational use, configuration and maintenance and smooth Application upgradation to take care of pipeline expansion in future.

2.28.3 The Application MMI shall provide Application operational displays and Application engineering & configuration displays for maintaining of the system, trouble shooting, etc.

2.28.4 Application MMI management, presentation & control functions of the entire pipeline shall be implemented on LDS server, which shall be also accessible from SCADA MMI workstations and Remote workstations in Client-server architecture. The SCADA Upgrade supplier shall coordinate with LDS supplier to ensure this is achieved.

2.28.5 Suitable triggering buttons/soft keys shall be provided on SCADA MMI workstations and Remote workstations to access LDS MMI client. SCADA and LDS suppliers shall be fully responsible for implementation of SCADA/LDS interface and SCADA MMI including all application displays, modelling profiles, modelling results, modelling configuration parameters pertaining to the thresholds/filters/weightage factors, LDS alarms/events, application operator actions, etc.

2.28.6 Online configuration changes of leak threshold values, weightage factors, and inventory alarm limits, pipeline efficiency alarm limits etc. shall be permitted with appropriate credentials of operator.

2.28.7 The displays on SCADA MMI shall include the standard displays for all the LDS modules, linked as a standard with the application configuration database including analogue & digital pipeline real time data, profiles and all modelling parameters, which shall be easily configurable for project-specific requirements. The LDS displays shall include the following displays as a minimum: -

- Profile displays – Pressure, flow, temperature, density, product properties (Viscosity, Celerity, velocity etc.), Pressure head profile superimposed on pipeline elevation profile, Pipeline Integrity profiles.
- All modelling profiles shall use distance (in km) as X-axis and various parameters as Y-axis. Application supplier shall ensure that application MMI be complete in all respects for displaying and printing the results of all the LDS modules and giving complete

information for monitoring & control of LDS package. The cross-country pipeline profile shall be displayed, and parameters indicated will detailed indications of each location/point.

- It shall be possible to display the values from the profiles for any point by pointing the cursor.
- Leak detection displays – flow/pressure imbalance alarms, leak detection, leak location, leak size, overall leak alarms, leak thresholds, base leak thresholds editor, weightage factors editor etc.
- Batch scheduling displays
- Batch tracking displays
- Instrument drift analysis display and instrument drift maintenance scheduler
- Supplementary modules display

2.29 Supervisory Control on SCADA monitor/Display

2.29.1 The Operator Interface shall transmit control commands to the remote site RTUs/PLCs and then verify the successful/unsuccessful operation of the control action.

2.29.2 The success of a control command shall take a maximum of 100ms to be confirmed by a corresponding change in the field. It shall therefore be possible on each control point in the database to define the time for a field device to confirm the control action. An In-transit state should be displayed showing the Operator the control is in progress.

2.29.3 The system shall also be able to transmit control commands to the RTU/PLC without expecting confirmation from a field device.

2.29.4 The SCADA system shall utilize a variety of safeguards against undesired commands. These safeguards shall apply to Operator error, communications noise, equipment failures, and software errors. This may include a confirmation popup before effecting the command.

2.29.5 One of the specific safeguards required is a true select-verify command control procedure, implemented between the Operator and the Operator

Interface. No command shall be sent to the remote site equipment until the Operator procedure is completed.

2.29.6 In the event of a communication failure, Nairobi Control Center shall attempt up to three (user configurable) retries to complete the command sequence before aborting the command. However, the Master shall continue monitoring the link status and immediately resume communication once link is restored without an operator intervention.

2.29.7 On completion of the message exchange sequence with a remote site RTU/PLC, a timer shall be initiated to check for the completion of the control action by the controlled device. A control completion indication (successful or unsuccessful) shall be reported on the MMI and logged as soon as such completion is detected.

2.29.8 All points under control shall be temporarily inhibited from alarming until the status changes as requested or the time-out interval has elapsed. If the time-out interval expires without the status change occurring, then alarm and log messages shall be generated.

2.30 RTU/PLC Communications and Monitoring

2.30.1 The system shall monitor for failure of communications to each of the remote site RTUs/PLCs. Loss of communications shall result in automatic retries to re-establish communications. Continued failure shall result in the data in the real-time database being flagged as out of date or stale. This data status shall result in a user definable change in the display attribute for the points affected.

2.30.2 Each data retrieval request shall be treated individually and only points included in that request shall be marked as stale. For example, if three separate polls were issued and only one range did not get a response from the RTU/PLC, then only points on that range would be marked as stale.

2.31 PLC/RTU Communication Statistics

2.31.1 The system shall collect statistics for the success and failure rates of communications to each remote PLC/RTU including retries, number of broadcasts, number of system queries and system responses. It is expected the SCADA supplier to install rack-mounted modules on

PLCS without timestamping capabilities with IEC-60870 modules for localized event logging and update/backfill SCADA once link is restored.

2.31.2 This information shall be available as an integral part of the overall system status information. It shall be possible to process this information like any other SCADA signal and produce trends and reports to identify problem areas of communications so that repairs can be performed.

2.32 Pipeline Metering

2.32.1 The receipt of products into and the delivery of products from the pipeline shall be metered at each entry and exit point. The SCADA system shall be equipped with metering suite that shall compute, display, transmit to other systems e.g., SAP, and store data log for metering system. The metering suite shall be critical in KPC operations as detailed in this document.

2.32.2 Flow metering data collected by the metering suite shall include corrected, calculated, and uncorrected:

- Live flow measurement variables (flow rate, pressure, and temperature of meters),
- Current flow meter time and date,
- Accumulated hourly, daily, and weekly totals,
- Correction factors for transported product types,
- Transported product makeup and content settings and
- Start and finish times for each transported product.

2.33 Other SCADA Functionality

2.33.1 *SCADA Displays*

In addition to displays described in these technical specifications, the SCADA provides the following associated displays:

- Directory
- Overview of the entire pipeline.
- Overview of the entire remote site station.
- Pipeline auto-controls i.e., entire pipeline auto-start/stop controls.
- Group overview of a single process area.

- Detailed page for each station and devices.
- Mimic diagrams or status lists of process areas.
- Alarm summary displays.
- Common event file displays.

2.33.2 *Status Lists*

The SCADA provides the following status and alarm indication:

- Alarms
- Shutdowns
- Faults
- Inhibits/Isolation
- Maintenance Inhibits
- HVAC status

2.34 Nairobi Control Center – Remote site (RTU/PLC) Communications

2.34.1 The Application shall support both internal and external communications functions.

2.34.2 The communications network internal to the RTU/PLC shall be designed and implemented in such a way that the passing of data and commands between modules shall not be prevented by the failure of any module not directly involved in the communication exchange.

2.34.3 In addition, the internal network shall not become overloaded under the heaviest traffic possible in an RTU's/PLC's configuration.

2.34.4 The LED indications shall be provided to check the health of RTU/PLC communication module.

2.34.5 Nairobi Control Center shall have a self-diagnostic feature and software watchdog timer devices to monitor & report the healthiness of RTUs/PLCs.

2.34.6 It shall scan and acquire parameters from process as per programmed scan cycles.

2.34.7 Additionally, the system shall be intelligent in support of the following:

a) It shall process the analogue data for high-low limit violations as per stored limit tables and communicate the same with time stamping.

b) The high and low alarm limits settings for any process variable in RTU shall always remain synchronized with SCADA downloaded database high and low limits settings.

c) Further the high and low alarm limits settings in the SCADA database shall not be affected by the restart of the whole database and shall not revert to the default values in the database.

d) Linear conversion to engineering units and input filtering.

2.34.8 The system shall be able to store the configuration data and the process database upon power failure.

2.35 CCTV For Pump Monitoring Suite

2.36 Fire Alarm System Suite

2.36.1 The SCADA system shall have a fire alarm system module into which KPC fire alarming systems shall graphically be represented.

2.36.2 The graphical representation shall be per pumping station, area, facility or a group of equipment.

2.36.3 In case of buildings, each device shall be mapped in the building plan per floor and all devices addressing be mapped with appropriate colors depicting health, fault, alarm, or out of service. The mapping addresses (Modbus TCPIP) will be provided during engineering phase.

2.36.4 The exploded floor plans shall be individual pages, selected from clicking the pump station, group or any form of selecting buttons.

2.36.5 In event of an alarm in the building, the system should be able to point to the actual device and which floor/location.

2.36.6 It should be possible to extract status, alarms, events from the Fire Alarms Suite to spreadsheet e.g., MS Excel for analysis.

2.36.7 The existing Fire Alarm system panels are as follows:

No	Station	Physical Location	Fire Alarm Panel	Connected to PLC
1	PS 1	Control Building	DF 4000	NO
2	PS1A/3A/5A/7A	Control Building	AUTROSAFE BS420 by Autronica	YES
3	PS2/4/6/8	Control Building	DELTA OP by ELTEK	YES
4	PS 12	Control /Admin Building	CHEETAH	NO
		Safety Office	Menvier MF 200	NO
5	PS14	Control Building	Minerva 1000	NO
			MIRCOM Pro 2000	NO
		KOSF Admin Building	DF6000	NO
6	PS 9	Admin Building		NO
7	Nairobi Terminal PS 10	NCC/QC/Motor Vehicle Building	DF6000	NO
		PS 21A		NO
		PS21 B		NO
		HQ	DF6000	NO
		PS 10/11 Switch-room		NO
8	PS 22	Control Building	DF6100	NO
9	PS 23	Control Building/MIOG	HAE/DF6000/	NO
10	PS 24	Control Building Line 2/4	DF6100 series/ Kentec Electronics Model series 8000	NO
11	PS 25	Control Building/ Shippers	Model series 6000 Kentec	NO
12	PS 26	Control Building	Series 8000 UK	NO
13	PS 27	Control Building	Simplicity plus 126	NO
14	PS 28	Control Building	ADEVA	NO

2.37 UPS System Suite

2.37.1 SCADA shall have a UPS system module that will aggregate all KPC control systems UPSs into informational library.

2.37.2 The status of UPSs shall be communicated to SCADA UPS module that will be structured into pump station, location, facility or group, and the information collected from the UPSs be on real-time.

2.37.3 It should be possible to extract status, alarms, events from UPSs to spreadsheet e.g., MS Excel for analysis.

2.37.4 Standard Modbus TCPIP protocol is expected to be used for information collection.

2.38 Cathodic Protection (CP) Stations Monitoring

2.38.1 The proposed SCADA upgrade shall have a CP monitoring module that will aggregate all KPC CP stations into electronic informational library in SCADA.

2.38.2 The status of CP stations shall be communicated to SCADA module that will be structured into pipeline CP location and the information collected from the CP be on real-time.

2.38.3 It should be possible to extract status, alarms, events from UPSs to spreadsheet e.g., MS Excel for analysis.

2.39 Cathodic Protection (CP) Monitoring and Reporting

- ✓ A provision shall be given in the SCADA Application for cathodic protection monitoring and reporting.
- ✓ The SCADA system shall be able to remotely monitor all the Cathodic Protection Stations at the pump stations and provide the following information below:
  - Permanent Reference Cell Status. {Normal / Alarm Condition (Failed)}.
  - Pipeline Overprotected. {PSP reading less than – 3000mV (alarm condition)}.

- Pipeline under protected. {PSP reading greater than -850mV (alarm condition)}.

✓ The contractor shall provide suitable transducers for processing the following analogue signals to digital signal for each CP station location and transmitting to the Nairobi Control Centre SCADA:

- Pipe to Soil Potential (-4V to 0V)
- Cathodic Protection Transformer Rectifier Unit DC Output Voltage
- Cathodic Protection Transformer Rectifier Unit DC Output Current

✓ The transducers shall have electrical isolation between input and output. The isolation insulation shall withstand 2kV, 50Hz for minimum 1 minute. The accuracy class of the transducer shall be 0.5. The transducers shall be protected against input and output voltage surges. The transducer shall be suitable for driving up to 600 ohms load impedance located up to 500 m away and wired with 0.5 mm^2 copper conductor cable.

✓ Monitoring data from RTUs/PLCs that include cathodic protection I/O will be automatically gathered, analyzed, evaluated against established, entered Nairobi Control Center criteria and reports generated at configurable periodic intervals with minimum intervention.

✓ Nairobi Control Center software will maintain within the main database all **CP point** data.

✓ CP data points shall be configurable to be sampled continuously by Nairobi Control Center at intervals down to a minimum as specified elsewhere.

✓ At the configured Start/End of day SCADA system time every 24-hour period, a statistical analysis shall be performed by Nairobi Control Center SCADA software, and at this time and after every week the max, minimum, mean and standard deviation statistics will be calculated and stored permanently.

- ✓ All live and calculated CP data points shall be archived as normal SCADA points.

2.39.1 Pipeline Cathodic Protection Data Display

a) CP points shall be capable of being configured with alarm limits.

b) CP point alarms shall function identically to all other SCADA alarm points and be presented to the SCADA MMI in the same way.

c) The pipeline Cathodic Protection displays shall have a main screen in single line schematic form with icons representing each CP station site.

d) A double click on any CP station icon display shall present a menu offering dynamic real-time data in tabular or graphic form to display CP control set point values, calculated and real live CP point values, alarm status and alarm limit levels.

2.39.2 CP STATION LOCATION & DATA:

A: **Line 5 CP Station Locations within Pump Stations**

No.	Location	CP Station Description	Model/TRU Type	Chainage	Parameters to SCADA
1	Changamwe (Inside Switch room)	CP 1 – PS 1A	Variac Controlled Transformer Rectifier Manufacturer: BAC Corrosion Control Ltd UK **In power**: Single Phase 240Vac, 50Hz **Output DC output** Voltage: 45V dc	KM0.00	**Alarms:** (1) Permanent Ref. Cell Status (2) Pipeline Overprotected (3) Pipeline under protected **Analogs** (1) Pipe to Soil Potential (-4V to 0V) (2) Cathodic Protection

No.	Location	CP Station Description	Model/TRU Type	Chainage	Parameters to SCADA
			Current: 25A dc		Transformer Rectifier Unit DC Output Voltage (3) Cathodic Protection Transformer Rectifier Unit DC Output Current
2	Samburu (Inside Switchroom)	CP 2 – PS 2A	Variac Controlled Transformer Rectifier Manufacturer: BAC Corrosion Control Ltd UK **In power**: Single Phase 240Vac, 50Hz **Output DC output** Voltage: 45V dc Current: 25A dc	KM54.2	AS above
3	Maungu (Inside Switchroom)	CP 3 – PS 3A	Variac Controlled Transformer Rectifier Manufacturer: BAC Corrosion Control Ltd UK **In power**: Single Phase 240Vac, 50Hz **Output DC output** Voltage:	KM109.8	AS above

No.	Location	CP Station Description	Model/TRU Type	Chainage	Parameters to SCADA
			45V dc Current: 25A dc		
4	Manyani (Inside Switchroom)	CP 4 – PS 4A	Variac Controlled Transformer Rectifier Manufacturer: BAC Corrosion Control Ltd UK **In power**: Single Phase 240Vac, 50Hz **Output DC output** Voltage: 45V dc Current: 25A dc	KM172.0	AS above
5	Mtito Andei (Inside Switchroom)	CP 5 – PS 5A	Variac Controlled Transformer Rectifier Manufacturer: BAC Corrosion Control Ltd UK **In power**: Single Phase 240Vac, 50Hz **Output DC output** Voltage: 45V dc Current: 25A dc	KM230.2	AS above
6	Makindu (Inside Switchroom)	CP 6 – PS 6	Variac Controlled Transformer Rectifier	KM282.6	AS above

No.	Location	CP Station Description	Model/TRU Type	Chainage	Parameters to SCADA
			Manufacturer: BAC Corrosion Control Ltd UK **In power**: Single Phase 240Vac, 50Hz **Output DC output** Voltage: 45V dc Current: 25A dc		
7	Sultan Hamud (Inside Switchroom)	CP 7 – PS 7A	Variac Controlled Transformer Rectifier Manufacturer: BAC Corrosion Control Ltd UK **In power**: Single Phase 240Vac, 50Hz **Output DC output** Voltage: 45V dc Current: 25A dc	KM340.7	AS above
8	Konza ((Inside Switchroom)	CP 8 – PS 8	Variac Controlled Transformer Rectifier Manufacturer: BAC Corrosion Control Ltd UK	KM382.0	AS above

No.	Location	CP Station Description	Model/TRU Type	Chainage	Parameters to SCADA
			In power: Single Phase 240Vac, 50Hz **Output DC output** Voltage: 45V dc Current: 25A dc		
9	Embakasi Depot – JKIA (Inside Switchroom)	CP 9 -PS 9	Variac Controlled Transformer Rectifier Manufacturer: BAC Corrosion Control Ltd UK **In power**: Single Phase 240Vac, 50Hz **Output DC output** Voltage: 45V dc Current: 25A dc	KM442.0	AS above

B: **Line 2 CP Station Locations within Pump Stations**

No.	Location	CP Station Description	Model/TRU Type	Chainage	Parameters to SCADA
1	Nairobi Terminal	CP 21 – PS 21	Variac Controlled Transformer Rectifier Manufacturer: Global Cathodic	KM0.00	**Alarms:** (1) Permanent Ref. Cell Status (2) Pipeline Overprotected (3) Pipeline under protected **Analogs**

No.	Location	CP Station Description	Model/TRU Type	Chainage	Parameters to SCADA
	(Outside – Plant Area)		Protection Ltd, Telford Shropshire, UK **In power**: Single Phase 240Vac, 50Hz **Output DC output** Voltage: 25V dc Current: 10A dc		(1) Pipe to Soil Potential (-4V to 0V) (2) Cathodic Protection Transformer Rectifier Unit DC Output Voltage (3) Cathodic Protection Transformer Rectifier Unit DC Output Current
2	Ngema Outside – Plant Area)	CP 22 – PS 22	Variac Controlled Trans. Rectifier Manufacturer: Global Cathodic Protection Ltd, Telford Shropshire, UK **In power**: Single Phase 240Vac, 50Hz **Output DC output** Voltage: 25V dc Current: 10A	KM70.0	AS above
3	Morendat – Naivasha Outside – Plant Area)	CP 23 – PS 23	Variac Controlled Trans. Rectifier Manufacturer: BAC Corrosion Control Ltd UK	KM126.0	AS above

No.	Location	CP Station Description	Model/TRU Type	Chainage	Parameters to SCADA
			In power: Single Phase 240Vac, 50Hz **Output DC output** Voltage: 24V dc Current: 25A dc		
4	Nakuru (Outside – Plant Area)	CP 25 – PS 25	Variac Controlled Trans. Rectifier Manufacturer: Global Cathodic Protection Ltd, Telford Shropshire, UK **In power**: Single Phase 240Vac, 50Hz **Output DC output** Voltage: 25V dc Current: 5A	KM169.8	AS above
5	Sinendet – Mau Summit Outside – Plant Area)	CP 26 – PS 26	Variac Controlled Trans. Rectifier Manufacturer: Global Cathodic Protection Ltd, Telford Shropshire, UK	KM223	AS above

No.	Location	CP Station Description	Model/TRU Type	Chainage	Parameters to SCADA
			In power: Single Phase 240Vac, 50Hz **Output DC output** Voltage: 25V dc Current: 10A		
6	Burnt Forest Outside – Plant Area)	CP 26A – PS 26A	Variac Controlled Trans. Rectifier Manufacturer: Global Cathodic Protection Ltd, Telford Shropshire, UK **In power**: Single Phase 240Vac, 50Hz **Output DC output** Voltage: 25V dc Current: 5A	KM282.	AS above
7	Eldoret Outside – Plant Area)	CP 27 – PS 27	Variac Controlled Trans.Rectifier Manufacturer: BAC Corrosion Control Ltd UK **In power**: Single Phase 240Vac, 50Hz	KM325	AS above

No.	Location	CP Station Description	Model/TRU Type	Chainage	Parameters to SCADA
			Output DC output Voltage: 24V dc Current: 25A dc		

C: **Line 3 CP Station Locations**

No.	Location	CP Station Description	Model/TRU Type	Chainage	Parameters to SCADA
1	Sinendet (Outside – Plant Area)	CP 26 – PS 26	Variac Controlled Trans. Rectifier Manufacturer: Global Cathodic Protection Ltd, Telford Shropshire, UK **In power**: Single Phase 240Vac, 50Hz **Output DC output** Voltage: 25V dc Current: 10A	KM0.00	**Alarms:** (1) Permanent Ref. Cell Status (2) Pipeline Overprotected (3) Pipeline under protected **Analogs** (1) Pipe to Soil Potential (-4V to 0V) (2) Cathodic Protection Transformer Rectifier Unit DC Output Voltage (3) Cathodic Protection Transformer Rectifier Unit DC Output Current
2	Koru (Outside – Plant Area)	CP 28A – KORU	Variac Controlled Trans. Rectifier Manufacturer:	KM60**.0**	AS above

			Global Cathodic Protection Ltd, Telford Shropshire, UK **In power**: Single Phase 240Vac, 50Hz **Output DC output** Voltage: 25V dc Current: 5A		
3	Kisumu (Outside – Plant Area)	CP 28 – PS 28	Variac Controlled Trans. Rectifier Manufacturer: Global Cathodic Protection Ltd, Telford Shropshire, UK **In power**: Single Phase 240Vac, 50Hz **Output DC output** Voltage: 25V dc Current: 10A	KM120.0	AS above

D: **Line 4 CP Station Locations within Pump Stations**

No.	Location	CP Station Description	Model/TRU Type	Chainage	Parameters to SCADA
1			Variac Controlled Trans. Rectifier		**Alarms:** (1) Permanent Ref. Cell Status

No.	Location	CP Station Description	Model/TRU Type	Chainage	Parameters to SCADA
	Nairobi Terminal (Outside – Plant Area)	CP 21 – PS 21	Manufacturer: Global Cathodic Protection Ltd, Telford Shropshire, UK **In power**: Single Phase 240Vac, 50Hz **Output DC output** Voltage: 25V dc Current: 10A	KM0.00	(2) Pipeline Overprotected (3) Pipeline under protected **Analogs** (1) Pipe to Soil Potential (-4V to 0V) (2) Cathodic Protection Transformer Rectifier Unit DC Output Voltage (3) Cathodic Protection Transformer Rectifier Unit DC Output Current
2	Ngema (Outside – Plant Area)	CP 22 – PS 22	Variac Controlled Trans. Rectifier Manufacturer: Global Cathodic Protection Ltd, Telford Shropshire, UK **In power**: Single Phase 240Vac, 50Hz **Output DC output** Voltage: 25V dc Current: 5A	KM70.0	AS above
3	Naivasha (Outside –	CP 23 – PS 23	Variac Controlled Trans. Rectifier	KM126.0	AS above

No.	Location	CP Station Description	Model/TRU Type	Chainage	Parameters to SCADA
	Plant Area)		Manufacturer: BAC Corrosion Control Ltd UK **In power**: Single Phase 240Vac, 50Hz **Output DC output** Voltage: 24V dc Current: 25A dc		
4	Nakuru (Outside – Plant Area)	CP 25 – PS 25	Variac Controlled Trans. Rectifier Manufacturer: Global Cathodic Protection Ltd, Telford Shropshire, UK **In power**: Single Phase 240Vac, 50Hz **Output DC output** Voltage: 25V dc Current: 10A	KM169.8	AS above
5	Sinendet Outside – Plant Area)	CP 26 – PS 26	Variac Controlled Trans. Rectifier Manufacturer: Global Cathodic Protection Ltd, Telford	KM223	AS above

No.	Location	CP Station Description	Model/TRU Type	Chainage	Parameters to SCADA
			Shropshire, UK **In power**: Single Phase 240Vac, 50Hz **Output DC output** Voltage: 25V dc Current: 15A		
6	Burnt Forest (Outside – Plant Area)	CP 26A – PS 26A	Variac Controlled Trans. Rectifier Manufacturer: Global Cathodic Protection Ltd, Telford Shropshire, UK **In power**: Single Phase 240Vac, 50Hz **Output DC output** Voltage: 25V dc Current: 10A	KM282.	AS above
7	Eldoret (Outside – Plant Area)	CP 27 – PS 27	Variac Controlled Trans. Rectifier Manufacturer: BAC Corrosion Control Ltd UK **In power**: Single	KM325	AS above

No.	Location	CP Station Description	Model/TRU Type	Chainage	Parameters to SCADA
			Phase 240Vac, 50Hz **Output DC output** Voltage: 24V dc Current: 25A dc		

E: **Line 6 CP Station Locations**

No.	Locations	CP Station Description	Model/TRU Type	Chainage	Parameters to SCADA
1	Sinendet (Outside – Plant Area)	CP 26 – PS 26	Variac Controlled Trans. Rectifier Variac Controlled Trans. Rectifier Manufacturer: Global Cathodic Protection Ltd, Telford Shropshire, UK **In power**: Single Phase 240Vac, 50Hz **Output DC output** Voltage: 25V	KM0.00	**Alarms:** (1) Permanent Ref. Cell Status (2) Pipeline Overprotected (3) Pipeline under protected **Analogs** (1) Pipe to Soil Potential (-4V to 0V) (2) Cathodic Protection Transformer Rectifier Unit DC Output Voltage (3) Cathodic Protection Transformer Rectifier Unit DC Output Current

No.	Locations	CP Station Description	Model/TRU Type	Chainage	Parameters to SCADA
			dc Current: 15A		
2	Koru (Outside – Plant Area)	CP 28A – KORU	Variac Controlled Trans. Rectifier Variac Controlled Trans. Rectifier Manufacturer: Global Cathodic Protection Ltd, Telford Shropshire, UK **In power**: Single Phase 240Vac, 50Hz **Output DC output** Voltage: 25V dc Current: 10A	KM60**.0**	AS above
3	Kisumu (Outside – Plant Area)	CP 28 – PS 28	Variac Controlled Trans. Rectifier Variac Controlled	KM120.0	AS above

No.	Locations	CP Station Description	Model/TRU Type	Chainage	Parameters to SCADA
			Trans. Rectifier Manufacturer: Global Cathodic Protection Ltd, Telford Shropshire, UK **In power**: Single Phase 240Vac, 50Hz **Output DC output** Voltage: 25V dc Current: 10A		

Note: Where two or more pipelines share common ROW (pipeline route), one transformer rectifier is used at each CP station but the current to each pipeline is shared through Negative Bonding Box through variable resistance & shunts.

2.39.3 CATHODIC PROTECTION REFERENCE STANDARDS & CODES:

- ✓ BS 7361: Cathodic Protection Code of Practice for Land and Marine Application (BS EN 12954:2001)
- ✓ NACE SP0169 latest edition: "Control of External Corrosion on Underground or Submerged Metallic Piping Systems"; this standard

presents methods and practices for achieving effective control of external corrosion on underground or submerged metallic piping systems.

- ✓ NACE TM0497 latest edition: Measurement Techniques Related to the Criteria for Cathodic Protection on Underground or Submerged Metallic Piping Systems.
- ✓ BS 4343: "Code of practise for the selection, installation and maintenance of electrical apparatus for use in potentially explosive atmosphere."
- ✓ BS 7671: Requirements for Electrical Installation (formally IEE Regulation 16th Edition)
- ✓ BS EN 61010 -2-20-2007: Safety requirements for electrical equipment for measurements and control.
- ✓ BS EN 50178: 1998 Electronic Equipment for use in power installation.
- ✓ BS EN 60529: Degree of Protection Provided by Enclosure (IP Code)
- ✓ IP MODEL Code of Safety in petroleum Industry

  Part 1 1991: Electrical Safety Code

  Part 6: Pipeline Safety Code

  Part 15: Area Classification Code for Petroleum Installation

2.40 Automatic Tank Gauging (ATG) Suite

The Automatic Tank Gauging system shall be configured. The tanks data shall be availed in SCADA and displayed in detail at operator screens when such displays are opened. The following data shall be displayed:

- Gross Observed Volume (GOV)
- Gross Standard Volume (GSV)
- Indicated Volume
- Net Standard Volume (NSV)
- Indicated Product Level
- Total Calculated Volume (TCV)

- Total Observed Volume (TOV)
- Relative Density
- Product Pressure
- Product direction of movement (filling or draining) by directional arrow animation
- Tank grouping by product
- Tank product by colour
- Ullage
- Innage
- Product Temperature

The contractor shall configure trends which shall be selectable for a particular tank to indicated data consistence or otherwise specifically for density, pressure, product level.

It shall be responsibility of contractor to configure and link to ATG servers for data collection to SCADA. The ATG systems in KPC Depots are Rosemount and Endress + Hauser. Rosemount is installed at PS9, PS12, PS10, PS25, PS27 and PS28. PS14 has Endress + Hauser ATG system.

The tanks as installed in KPC are as follows:

DEPOT	**TANK ID**	**PRODUCT ID**
PS12	12TK 701	JET-A1
	12TK702	JET-A1
	12TK703	JET-A1
	12TK704	JET-A1
PS14	14TK201	MSP
	14TK202	MSP
	14TK301	AGO
	14TK302	AGO
	14TK501	DPK
	14TK502	DPK
	14TK503	DPK

DEPOT	TANK ID	PRODUCT ID
	14TK601	MSP/AGO
	14TK602	MSP/AGO
PS1	1-TK-201	SLOP
PS9	9-TK-701	JET-A1
	9-TK-702	JET-A1
	9-TK-703	JET-A1
	9-TK-704	JET-A1
	9-TK-705	JET-A1
	9-TK-101	JET-A1
PS10/11	10-TK-701	SLOP
	10-TK-702	SLOP
	10-TK-703	SLOP
	10-TK-704	SLOP
	10-TK-705	SLOP
	10-TK-706	SLOP
	10-TK-707	SLOP
	10-TK-708	SLOP
	10-TK-709	SLOP
	10-TK-710	SLOP
	11-TK-101	MSP
	11-TK-102	MSP
	11-TK-201	MSP
	11-TK-202	MSP
	11-TK-203	MSP
	11-TK-301	AGO
	11-TK-302	AGO
	11-TK-303	AGO
	11-TK-304	AGO
	11-TK-305	AGO
	11-TK-501	DPK
	11-TK-502	DPK
	11-TK-503	DPK

DEPOT	TANK ID	PRODUCT ID
	11-TK-504	DPK
	11-TK-601	MSP
	11-TK-602	AGO
	11-TK-603	MSP
	11-TK-701	IK
	11-TK-702	IK
	11-TK-703	IK
PS25	25TK101	MSP
	25TK102	MSP
	25TK201	MSP
	25TK202	MSP
	25TK301	AGO
	25TK302	AGO
	25TK501	DPK
	25TK502	DPK
	25TK601	SLOP
	25TK602	SLOP
	25TK603	SLOP
PS27	27TK101	MSP
	27TK102	MSP
	27TK201	MSP
	27TK202	MSP
	27TK301	AGO
	27TK302	AGO
	27TK501	DPK
	27TK502	DPK
	27TK601	SLOP
	27TK602	SLOP
	27TK603	SLOP
	27TK701	JET-A1
	27TK702	JET-A1
	27TK703	JET-A1
	27TK704	JET-A1

DEPOT	TANK ID	PRODUCT ID
PS28	28-TK-101	MSP
	28-TK-102	MSP
	28-TK-201	MSP
	28-TK-202	MSP
	28-TK-301	AGO
	28-TK-302	AGO
	28-TK-501	DPK
	28-TK-502	DPK
	28-TK-601	SLOP
	28-TK-602	SLOP
	28-TK-603	SLOP
	28-TK-704	JET-A1
	28-TK-701	JET-A1
	28-TK-702	JET-A1
	28-TK-703	JET-A1

Dump tank levels for the following Line V tanks shall be indicated:

STATION	TAG
PS14A	14A-TK-601
PS1A	1A-TK-601
PS3A	3A-TK-601
PS5A	5A-TK-601
PS7A	7A-TK-601
PS9A	9A-TK-601
PS10A	10A-DT-601 10A-DT-403

2.41 Pumps and Pumps Efficiency

The following is calculated shaft power/brake horsepower (BHP) and the fluid/water horsepower (WHP) from the parameters generated from the tests.

These will enable generation of three curves namely

a) Pump curve from head (H) versus flow rate (Q)
b) Efficiency curve from efficiency (ŋ) versus flow rate (Q)
c) Head and flow at best efficiency point (BEP)

$NPSH_R$ (Net Positive Suction Head required) This is the pressure required for satisfactory operation without causing cavitation and shall be use in our analysis.

Water horsepower = Head X Flowrate X Specific gravity/3960
WHP = H X Q X SG/3960

Brake horsepower (shaft power) = Head X Flowrate X SG/3960 X efficiency
BHP = H X Q x SG/3960 x ŋ

PS 24B LINE IV FLOWSERVE

Line	**Station**	**Flow (M^3)**	**Head (m)**	**RPM**	**Power**	**Eff. (%)**	**$NPSH_R$(m)**	**Shaft power**
PS 24B line IV	24-P-401A/B	287.2	1100	2690	979	74.5	4	
		337.6	1109.3	2765	1128	76.9	4.5	
		182.7	1168.5	2675	783	63	5.3	
		248.3	1372	2930	1140	69	5.5	
		267.15	955.1	2500	791	74.5	3.5	
		354.65	1249.5	2930	1329	77	5	
PS 21B LINE II FLOWSERVE								
PS 21B line 4	21-P-401A/B	311.1	780.9	2460	708	79.1	5.2	
		364.4	1021.2	2835	1078	79.6	6.7	
		196.85	901.1	2575	629	65.1	4	
		265.85	841	2520	683	75.5	4.6	
		285.75	961.1	2690	836	75.8	5.1	
		378.5	1081	2920	1183	79.8	7.1	
PS 23 LINE II FLOWSERVE								
PS 23-	23-P-01	296.72	1196.85	2987	1182.96	74.31	5.12	

Line	Station	Flow (M^3)	Head (m)	RPM	Power	Eff. (%)	$NPSH_R$(m)	Shaft power
line 2								
		257.92	1248.28	2988	1265.18	76.62	4.42	
		223.95	1285.27	2988	1447.90	77.26	4.08	
		173.47	1327.09	2990	1101.79	71.36	3.49	
		122.93	1349.51	2992	959.18	65.57	3.57	
LINE II PS 23 FLOWSERVE PUMPS								
PS 23-line 2	23-P-02	252.86	1194.85	2988	951.22	74.41	5.35	
		290.91	1147.35	2988	1037.11	75.39	4.65	
		400.08	970.97	2989	1183.67	76.88	4.31	
		219.49	1230.94	2990	892.74	70.99	3.64	
		169.93	11267.29	2991	781.88	64.52	3.58	
LINE I CAPACITY ENHANCEMENT PS 2, PS 4, PS6, PS8 FLOWSERVE PUMPS								
PS 02 line 1	2-P-301	447.97	1198.3	2978	1821.40	80.06	8.25	
		579.50	998.27	2972	2016.70	77.85	5.43	
		315.90	1328.90	2981	1535.10	74.32	4.17	
		184.10	1388.40	2985	1177.90	59.0	2.43	
		0.00	1401.30	2991	748.59	0.00		
PS 04 LINE 1								
PS 04 line 1	4-P-301	448.77	1228.40	2976	1866.70	80.24	8.19	
		579.50	1041.60	2971	2086.00	78.57	5.63	
		315.70	1341.90	2980	1561.00	73.78	4.17	
		184.10	1385.30	2986	1202.30	57.70	3.20	
EBARA PUMPS LINE 5 PS 01, 03 & 07								
PS 01	1A-P-401/402	650	510	2980		78.5	12.8	
		1000	771			92		
		525	404			63		
		633.5	519					

Line	Station	Flow (M^3)	Head (m)	RPM	Power	Eff. (%)	$NPSH_R$(m)	Shaft power
		869	828					
		903.5	881					

3 CABINETS

Cabinets shall be supplied by SCADA Upgrade Supplier. The Contractor shall supply all necessary communication cabinets, internal wiring and equipment for the SCADA & LDS system.

3.1Mechanical Construction

3.1.1 Panels shall be shipped to site with all components installed and fully wired.

3.1.2 Panels are to be built by specialized panel manufacturers, preferably Rittal Panel and shall be supplied as following features:

a) The panel shall be installed within an air-conditioned area.

b) The panel shall be supported via a sub frame to be supplied by the Contractor, which is bolted to the floor. The panel shall be constructed for installation at floor level.

c) All cabinet support drawings shall be provided by the Contractor.

3.1.3 All incoming signal and power cables shall enter the panel from the bottom, via a removable gland plate and will be terminated in accordance to industrial standards. All openings remaining after entry of system cables shall be sealed against the ingress of dust or rodents. The dust seals shall be easily removable to enable entry of future cables.

3.1.4 Panels shall be of the totally enclosed cubicle type, freely ventilated, and general purpose. The panel shall incorporate filters to protect against dust ingress. The panel shall be fitted with full size key lockable access doors as required. Front door shall have a suitably sized glazed viewing section.

3.1.5 It is desirable that the doors to lock at 90° when full open.

3.1.6 Cooling fans shall be provided for air circulation and ventilation purpose. The fans should have minimal noise as possible.

3.1.7 Press-formed methods shall be used for construction with internal reinforcement to prevent deformation and flexing. 3mm minimum

thickness carbon steel zinc-coated or industry accepted sheet shall be used.

3.1.8 Easy access shall be provided within the panel to all items and components requiring operation and maintenance.

3.1.9 Panel finish shall be of a high and durable quality suitable for the environment. This will normally be an air-dried epoxy type paint of semi-gloss texture to the colour Grey (RAL No. 9002). Contractor shall submit a painting specification for approval prior to proceeding with manufacture. Blemishes, scratches, or chips in the finished surface shall not be accepted.

3.1.10 Panel lighting shall be provided via LED lamps where required within the panel and shall have easily accessible switches. The lighting shall be switched ON by a door switch upon its opening, unless manually switched OFF. The panel shall be provided with lifting eyebolts, of a suitable number to prevent panel deformation upon lifting.

3.1.11 The panel shall have a limit switch that shall be logged into SCADA wherever panel door is opened.

3.2 Cabinet and equipment Identification

3.2.1 Each cabinet shall have an identifying nameplate fixed on the front and rear with screws or adhesive material. KPC tagging system shall be used, the format of which will be advised. Internally mounted equipment shall be clearly identified by nameplates as to the device or function they serve by nameplates using labels.

3.2.2 Tag names for equipment and instrumentation shall be unique throughout the pipeline.

3.2.3 A nameplate of the laminated plastic type shall be provided under instrument at both front and rear of panel. On the front, they shall be engraved with tag number and duty and at the rear with tag number only.

3.2.4 Nameplates shall be secured with self-tapping screws or better securing means. A nameplate schedule shall be provided by Contractor for approval prior to manufacture.

3.2.5 All electrical terminals inside the system rack and programmers' terminal shall be clearly numbered and permanently identified on the terminals and the system wiring drawings.

3.2.6 Live parts of equipment and terminations carrying voltages above 50 volts shall be covered with a transparent insulation plate bearing the appropriate warning text.

3.2.7 All electronic cards shall have unique serial numbers which shall be indicated on the hardware test report.

3.3Wiring and Termination

3.3.1 All wiring shall be mechanically supported within plastic non-flammable trunking with covers.

3.3.2 Trunking shall be strategically placed so as not to obstruct any panel components.

3.3.3 The trunking shall be sized such that the total cross-sectional area of the wiring within it shall not exceed 60% of the trunking cross sectional area.

3.3.4 Power cabling and instrument signal cabling shall not be installed within the same section of trunking and shall be suitably separated to avoid interference. Wire used shall be 0.75mm^2 minimum.

3.3.5 Terminals shall be clearly identified. Group headers shall be used to identify rows/groups of terminals. Preference is for different coloured terminals for various voltages.

3.3.6 All System cables, ribbon cables and data highway cables shall be within the Contractor's scope. System cables between equipment cabinets, termination cabinets and peripherals shall utilize plug and socket techniques to the maximum extent possible.

3.3.7 Each cable shall be supplied with a unique cable marker at both ends. Cable schedule and block diagrams shall be provided to enable quick hook-up at site.

3.3.8 Electrical wiring shall be in accordance with applicable electrical standards.

3.3.9 Wiring diagrams shall be complete with grounds in recommended wire sizes, type, and shielding required for the electrical circuits between components that are to be wired. The relevant sections of the technical specification shall be complied with.

3.3.10 Where individual loop protection is not a feature, the Contractor shall provide individual fusing in the termination cabinets. Fused terminals with neon status lamps, shall be provided for powered outputs.

3.3.11 The Contractor shall supply mounted and fully wired suitable fused galvanic isolators for all intrinsically safe circuits. These isolators shall be wired between the incoming terminals and the controllers.

3.4 Earthing

3.4.1 Each panel section shall be supplied with two 6mm x 25mm tinned copper earth bus bars at the bottom of the panel. One bar shall be isolated from the panel frame and shall be used for earthing the shields of all signal cables. The second bar shall be used for equipment grounding.

3.4.2 The Contractor shall provide grounding drawings, specific to this installation, showing all system cabinets and the AC/DC signal wiring, and all grounding recommendations for tying the system into the plant grounding.

3.4.3 The drawings shall clearly identify the size and location of bus bars from which KPC shall make connections to the plant grounding grid. The maximum resistance to ground shall be clearly specified by contractor.

3.4.4 At bid stage the Contractor shall provide the complete System earthing schematic detailing interconnections and minimum resistance values required.

4 Power Supply and Distribution

4.1 Electrical equipment shall be suitable for 240V AC, 50Hz single-phase power supply supplied from a UPS with live, neutral and ground. The contractor shall supply the rack mounted UPS which shall include 40% spare capacity.

4.2 Redundant feeders shall be supplied to each panel. Each supply shall be capable of taking the full load of the System.

4.3 The Supplier shall include the monitoring of both the UPS feeders into the System as digital inputs.

4.4 The UPS power source will have auto switch. The SCADA system functions shall not be affected by the power supply switch-over. Any other inputs/outputs required by the SCADA and Associated systems under this contract shall be responsibility of the Contractor. Such voltages shall be derived from the UPS supplied under this contract.

4.5 The system shall be provided with isolation mechanisms to prevent noise from the electrical power interfering with the system performance. The isolation devices required, and the power ratings shall be included in the contractor's proposal.

4.6 Sub-distribution to all the power users within the System cabinets, workstations and printers will be by the contractor. Each item within the panel requiring electrical power shall be fed from a fused mains isolator, with an MCB for each consumer. Sufficient isolation facilities on the DC sub-system shall be provided to enable maintenance of components with minimum disturbance to healthy devices.

4.7 The power distribution cabinets will be sized to provide 20% spare feeders of each rating or one no. minimum fully wired up to terminal blocks. In addition, 10% spare space for future additional requirement shall also be provided.

4.8 All power supply units shall be monitored for faults by hardwiring into the System as inputs. The contractor shall increase the input count as required to include these alarms.

4.9 Power distribution to devices shall be arranged such that the loss of an individual circuit does not result in complete loss of control capability or create unsafe operating conditions. System shall be capable of detecting failure of power to a loop, an open input circuit etc.

4.10 All the 24VDC power supply units shall be fully redundant with maximum load (including installed spares) on each supply not exceeding 70% of the rating. It shall be possible to remove at least one power supply for maintenance without affecting the overall load requirements of the system.

4.11 The panel shall be provided with easily accessible 240VAC utility outlets. Total number will depend on final panel layout and the installed equipment requirements.

4.12 *Lighting and Power Socket Outlets*

a) All cabinets or suites of cabinets shall be provided with fluorescent tube light fittings complete with manual on/off switches.

b) Each equipment cabinet shall be provided with a 240 VAC. Power socket outlet (Type G) separately fused for powering test equipment.

4.13 *Ventilation*

a) Ventilation requirements shall be arranged to avoid the creation of local hot spots. Forced ventilation systems shall not be fitted to Cabinets unless agreed to by KPC.

b) If a forced ventilation system is supplied, it shall consist of twin paralleled systems each rated at 100% duty. Each system shall be fed from the supplied UPS via its own dedicated fuses and circuit breakers.

c) Fan failure shall annunciate at the Operator stations. All fan units for cooling shall carry a vane switch which shall indicate fan failure and generate a system diagnostic alarm.

d) All rotating parts shall be adequately guarded to meet Quality Inspection & test requirements.

5 SYSTEM SOFTWARE

This section describes the basic characteristics of the software to be provided to facilitate the execution of all functions specified and for future extensions to the system. Software shall be such as to ensure continuous availability of each function to the system.

5.1 Data Processing

5.1.1 Data Processing is the handling of Pipeline system data in the Application Servers. It shall be possible to acquire, manually enter or generate data by other applications.

5.1.2 The data processing shall deal with the following items:

a) Measured values
b) Indications
c) Counters
d) Data Flags
e) Secondary Source Data

5.1.3 *Measured values*

Each measured value (analogue point) shall be processed in the Application Servers prior to placing the value in the system database. The processing shall include:

a) Conversion to engineering units
b) Limit checking
c) Zero clamping

5.1.4 All Operator workstations (MMI) at Nairobi Control Center shall have the same databases and it shall be possible to operate any section of the pipeline from any workstation based on the global database roles & authorizations assigned.

5.1.5 However, system/concept shall be capable of disabling control and alarms (including printing) for pipeline sections outside the authorizations of Operator workstation. This will ensure no interference by alarms from sections not controlled by the Operator workstation & unauthorized access to other sections of pipeline.

5.1.6 *Graphics*

The graphics for each Operator workstation shall consist of a combination of Supplier's standard graphics and customized graphics.

5.1.7 *Standard Software*

a) As far as practicable all software modules offered shall be standard. Standard software shall be defined as follows:
   - Software which has been previously installed and provided satisfactory operation and control of similar control systems.
   - Software that requires minimal tailoring with agreed parameters to suit the requirements specified, is scalable for different size sites.
   - Software for which standard documentation is available.
   - Software for which correction/updating facilities are available to all users. The latest version supported by the Supplier.

b) Configuration function blocks and ladder logic conform to these definitions.

c) Any known bugs, faults or problems are to be identified at the tender submission stage.

5.1.8 *Program Structure*

a) All compiled software functions shall be constructed from individual modules, with clearly defined interfaces between the modules. Each module shall provide a specific component function and be designed such that changes in one module require no changes to any other module.

b) The program shall be well documented with the reason for each module included in the program. Notes shall be included explaining any calculations or logic used. Reference to logic diagrams and the logic diagram number system shall also be included.

5.1.9 *Programming Languages*

a) Programming languages supported by the operating system software shall be stated, specifically detailing what is offered. Further, the language(s) that the application programs are written in shall be stated.

b) A System Programming Language shall be included that is designed to facilitate the implementation of customer specific functions. It shall provide an interactive definition editor as well as a text-based editor.

c) The programming language shall include SCADA specific instructions and functions to simplify the generation of high functionality programs.

d) In addition, it shall have interfaces to any item in the Real-time database.

e) A graphical debugger shall be available to allow the testing of the created functions.

5.1.10 *Editors, Libraries and System Utilities*

The system shall include a full screen editor, routine library, and system utilities such that facilities exist to perform programming and system maintenance on the system programs.

5.1.11 *System Management and Monitoring*

Each networked SCADA server and workstation shall be able to act as an SNMP client. Each SCADA device shall be monitored by the Network Management System and shall respond via the SCADA networks.

5.2 Database Software Interfaces

5.2.1 *Real-Time Database*

a) The real-time database shall be a high-performance memory-based design capable of providing a high rate of data processing to support concurrent real-time SCADA functions such as data

collection/processing, alarm/event processing, historical data management and MMI requests.

b) The system shall also be provided with a graphical user interface for direct interactive user queries of the database. Access to the real-time database shall be restricted by user logon privileges.

c) Realtime polling speed must be better than 20 microseconds.

5.2.2 *Historical Database*

a) Real-time data shall be saved into a historical database system for long term processing and archiving. The historical database shall be disk based and shall use the RAID disk array, network drives or best industry practice storage that ensure availability of data. It shall be possible to transfer archived data to other media safely without introducing virus into storage.

b) Analogue data shall be treated as discrete snapshot samples that shall be compressed as the data retention period increases.

c) Discrete (status) data shall be treated as a time stamp on the change of state from 1 to 0 and vice versa. If averaging and data compression is applied to discrete data, it shall provide a count of the number of changes of state in each time interval.

d) The sampling/averaging intervals for processing real-time data into historical data shall be user definable and user configurable.

5.3 Diagnostic Software

5.3.1 The prime objective of the diagnostic software shall be to provide, by means of online and offline test programs, continuous correct operation of all system functions by monitoring the health and resource utilization of the system, even when system components fail.

5.3.2 To meet this objective the diagnostic software and any associated hardware shall as a minimum perform the following duties:

a) Online monitoring of system hardware and software to detect system malfunctions and to take corrective action before they have a

deleterious effect on the control system and the station functions. Architectural network with healthiness indications shall be provided to give maintenance personnel a glimpse of system functioning.

b) Provide messages for recording invalid software operations, system hardware faults and automatic/Operator instigated, control system re-configurations. Also, to update the system configurations, and displays.

c) Provide fail-over and restart facilities. Fail-over and individual device initiation should not affect the real time operation of the online system.

d) Provide offline diagnostics to permit detailed tracing of faults.

e) The facilities being offered to satisfy the general requirements specified above shall be indicated clearly.

5.3.3 *Equipment Failures*

a) Equipment failures and faults shall be automatically alarmed and notified to the user via the normal SCADA user interface and MMI system. It shall not require system maintenance to specifically log onto the system to check for alarm and error conditions.

b) All such alarms and events shall be recorded in the SCADA system in alarm/event log.

5.3.4 *System Utilization*

Utilities shall be provided to monitor the level of utilization of key resources such as CPU and disk capacity. These shall be configurable with alarm set points such that when the utilization level exceeds the alarm limit, an alarm is generated in the SCADA system. These utilization data shall also be stored on the historical database system for future comparison and trending purposes to detect abnormal changes in the system.

5.3.5 *Network Utilization*

Network traffic monitoring shall be available to check for and identify network problems such as bad cables/connections or defective devices and

transceivers. The level of traffic on any LAN shall not exceed 15% of the capacity of the LAN.

5.4 Software Licensing and Revision Upgrades

All software provided to meet the requirements of this specification shall be provided complete and without further or ongoing licensing fees. All revision upgrades released prior to the issue of the Final Certificate shall be provided free of any charges or installation fees for two years. KPC may decide not to upgrade to the new revision.

5.5 Restart

5.5.1 The Operator workstations, and the SCADA system shall automatically restart to restore the normal mode of operation after a critical hardware or software failure, or after major system functions have been suspended for a length of time. Minimum Operator involvement shall be required during restart conditions.

5.5.2 It shall not be necessary for any program or configuration parameters to be downloaded from Nairobi Control Center or any terminal device to any system to successfully do a restart.

5.5.3 The following are some of the conditions that will cause a restart to occur:

a) Software system manually booted from bulk device this action might occur after maintenance has been performed on part of the computer system.

b) Critical hardware or software failure occurred, but now healthy.

c) Resumption of AC power.

d) Loading of system changes.

e) Operator initiated.

6 SYSTEM PERFORMANCE

When the systems are all installed a system performance test shall be carried out to confirm all the performance parameters are achieved.

6.1 Performance Test –Test/trial run

6.1.1 Test for continuous operation of the system with the required system reliability and availability. This test aims at keeping the complete SCADA and Associated Systems (SCADA & LDS integrated system) in operation 24/7 for a period of 30 days.

6.1.2 Test run will commence on successful completion of SAT for the integrated SCADA & LDS systems. In case of failure, the test run will be restarted till the system operates without failure of any system functionally for 30 days straight without interruption.

6.1.3 The warranty phase of this contract shall start after successful completion of trial run. The representatives of suppliers shall be present during complete duration of trial run.

6.1.4 Warranty shall be 1 year from the date of handing over the system after successful commissioning and certificate issued.

6.1.5 The contractor shall have a service engineer available during 1-year warranty period. He shall maintain the complete system during the period. The cost of this engineer is the responsibility of the supplier.

6.1.6 The supplier shall enter into renewable post warranty comprehensive maintenance services agreement with the KPC as indicated in the form of agreement for all the SCADA and LDS systems, with unlimited numbers of breakdown calls attended or any other requirement by KPC.

6.1.7 The requirement of spares for computer servers, workstations and network equipment shall be submitted together with the "As Built "documents and as part of quotation for Comprehensive Maintenance Service Contract whenever it becomes due.

6.2 Availability and MTBF

6.2.1 The Contractor shall provide calculations which show that the system configuration proposed shall meet the availability specified in this section.

6.2.2 The Contractor shall supply the individual MTBF for all equipment supplied under this contract.

6.2.3 The system shall be engineered to ensure that no single failure in the system shall cause risk to personnel or plant or cause the plant to trip.

6.2.4 The system shall demonstrate an availability exceeding 99.99%.

6.3 Industry standards

No proprietary products shall be acceptable.

6.4 Supervision of PLC/RTU

6.4.1 The PLC communication shall be supervised, and statistical information shall be generated.

6.4.2 Communication errors shall be detected and after a defined number of consecutive communication errors, the PLC shall be set inoperable. If the PLC is configured with an alternate communication channel (dual ported PLC) then communication shall be attempted over this channel before the PLC is set inoperable.

6.4.3 All data from a PLC detected as “Inoperable” or set “Out of Service” shall be marked as invalid.

6.4.4 The SCADA system shall attempt to re-establish the communication with an inoperable PLC periodically and shall resume normal communication immediately the restoration is done without requiring special action done. This communication can be stopped from the operators, for example if maintenance is performed on the PLC.

6.4.5 The status of each PLC has to be primarily checked by the PLC itself and reported to the SCADA system. This information, and the information generated in the PLC archiving module that shall be supplied as indicated in these specifications, are collected and stored in the database and shown in dedicated PLC information database.

6.5 RTU/PLC Status Check

6.5.1 Status Check function shall be used to acquire the most recent data from the PLCs. The following features shall be available:

a) An operator can issue a status check command for a Pump station. If the Pump station contains more than one PLC, such a command results in status checks of all PLCs within the station.

b) In case a PLC is inoperable, it will be cyclically polled with status check commands until it has become operable.

c) A status check is made to all PLCs as part of the start-up procedure of a PLC module and accordingly upon a start of the system.

d) If the status of an PLC is changed to 'In Service' a status check is sent to the PLC for onward transmission to SCADA.

6.5.2 A status check command shall acquire all measured values and indications from a PLC and the database is updated with the acquired data.

6.5.3 An alarm shall be generated if not all data is returned within a pre-defined time. A status list shall show the missing data. In addition, this data is marked as 'Not Updated'.

6.6 Conversion to Engineering Units

6.6.1 For analog type measured values, the binary representation must be converted by the system to engineering units. The nonlinear conversion is defined as a piecewise linear curve with breakpoints.

6.6.2 For digital type measured values, the binary representation of the value is decoded in the SCADA application Servers.

6.6.3 The following formats shall be processed in addition to the processing that is done in the selected PLC:

a) 32bit floating points values
b) 64bit floating values
c) Doubles
d) Integers
e) 16-bit 2s complement
f) bit 2s complement.
g) other standard industry data formats.

6.7 Limit Checking

6.7.1 Operating Limits shall be used to define the nominal operating ranges of associated measured values.

6.7.2 Each measured value shall be assigned up to five pairs of limits. Typically, the limits shall be used to identify warning conditions and emergency conditions for the value being monitored.

6.7.3 Manually entered operating limits shall be validated to ensure that no data errors are introduced. The entry of a new limit value initiates an error check processing on the entered value. The following validation checks shall be performed on each entered operating limit value:

a) The entered value must have the correct relative magnitude with respect to other operating limits.

b) The entered value must be in the defined feasibility (transducer) range for the measured value.

6.7.4 The successful entry of a new limit value initiates an event.

6.7.5 *Limit Violation Detection in Nairobi Control Center*

The limit checking process shall be initiated in the application server in the following cases:

a) Upon receipt of a new measured value from a PLC in response to a polling activity or a Status Check, for those measured values designated for remote limit checking.

b) On the result of each measured value calculation

c) On each measured value which is entered manually

d) Upon entry of a new limit value

e) Each measured value must be compared with the designated limits to detect limit violations.

6.7.6 Detection of a limit violation results in the appropriate status flags for the object being updated regarding the particular limit, which was exceeded.

The measured value itself shall be stored and event/alarm processing is initiated for all detected limit violations according to the alarm processing selected.

6.7.7 If a measured value is included in a status calculation, then a limit violation for that measured value triggers the calculation.

6.7.8 *Blocking of Limit Checking*

a) Each of the limits may be blocked from supervision which will prevent limit processing when a limit violation occurs.

b) The block status for each limit can be manually entered on the information picture for the measured value object using the manual data entry dialog.

6.7.9 *Dead-band Processing*

a) To eliminate needless multiple alarm generation for values which are fluctuating around a defined operating limit, each measured value for which operating limits have been defined, can be assigned a non-zero dead-band.

b) A limit violation is detected for a measured value as soon as the limit value is crossed. However, to return to normal, the measured value must cross the limit value in the return-to-normal direction by an amount which exceeds the dead-band value for that measured value.

6.8 Zero Clamping

6.8.1 Zero Clamping shall be utilized to provide a definite value when a measurement is close to zero. This function shall use a dead band to create a null zone around zero. When a value enters this zone, it is clamped to

zero. The zero dead-band range shall be definable for each telemetered measured value.

6.8.2 While this facility is generally used concerning the zero value, it shall be used in the same way to define a dead-band range around any magnitude of a value.

6.8.3 The transition of a measured value into the zero dead-band zone shall be used to set a status value or to trigger a calculation.

6.9 Gradient or Rate-of-Change Processing

6.9.1 The gradient shall be evaluated for a subset of measured values. For these points, a gradient shall be calculated as the absolute value of the slope of the straight line through the first and the last value of the last "n" samples.

6.9.2 The sample time, or log interval, is a user-defined parameter. When exceeding a predefined value, the slope will be subject to normal limit checking.

6.10 Indications

6.10.1 All indications (status points) shall be monitored for state changes.

6.10.2 *Initiation of Processing*

The change detection process is initiated in the application server:

a) For indications which are received from an PLC in response to polling
b) For each indication which is entered manually by the operator
c) For the result of each indication originating from another application

6.10.3 *State Change Detection*

State change detection must be accomplished for each telemetered indication by comparing the received indication state with its state in the database.

6.11 Supervision of Three-state Points

6.11.1 Double indications that reflect the transitional state (0/0 or 1/1) shall be subject to time supervision, to separate a condition truly transitional from a device anomaly. A long delay will initiate event processing.

6.11.2 The allowed transition time can be defined for each type of process device. For this purpose, every double indication shall be assigned to a delay group corresponding to the type of device.

6.12 Interlocking

6.12.1 An Interlock function shall be provided that prevents prohibited commands and manual entries of inappropriate status. For a two-state device the operator shall be able to define interlock conditions which must be valid to allow switching of a device to ON or OFF.

6.12.2 Control requests that do not meet these conditions will normally be rejected but can be by-passed in emergency and test situations.

6.12.3 This function shall allow the user to select pre-defined interlock conditions.

6.12.4 Interlock conditions shall be logical; for instance, a certain valve is open, a device status signal is in “remote” position, or a tank is de-commissioned.

6.13 Definition of Interlock Conditions

6.13.1 The tests in the Interlock function shall be applied within the following areas:

a) Topological conditions
b) State of indications
c) General conditions

6.13.2 The conditions (rules) are primarily intended for:

a) On/Off control of two-state devices
b) Manual data entry of indications

6.13.3 The conditions shall also be used by other applications performing controls or data entries.

6.14 Multiple interlock conditions

6.14.1 The internal Interlock function design shall facilitate the creation of many similar interlock sequences, that is, when the functional condition is the same and only the object to be tested against differs.

6.14.2 The list of tested objects can thus be created independent of the functional condition and several defined object lists may be combined with the same functional condition.

6.14.3 One sequence of interlock conditions, using the same or different object lists, can be assigned to more than one controllable device.

6.15 Automatic Interlocks

6.14.1 The system shall include already some predefined interlock conditions, which are based on topology and do not need a special programming.

6.14.2 These are so called Automatic Interlock Checks and include:

a) Preventing any device operation in the presence of ESD.
b) Preventing issuing tank to receive product.
c) Preventing running pump without alignment.
d) Preventing starting pump before filling.
e) Preventing closing of valve which is online. Among others.

6.16 Using the Interlock Function

6.16.1 If an interlock condition is assigned to an object, the condition or sequence of conditions must be executed each time an ON or OFF function is requested.

6.16.2 If the result of the checks does not allow the required control action, the dialog is terminated, and an error message shall be presented to the operator on the display monitor. The rejection shall be registered as an event.

6.17 Using the Bypass Function

6.17.1 The Interlock function shall include an alternative condition. This alternative shall be used to initiate a bypass option by the operator before the execute command is given. All sequence events related to this function use shall be logged and misused auditable.

6.17.2 This shortcut must be available to overcome a negative response from the primary Interlock function.

6.17.3 This is primarily intended to be used in emergency situations, when the data used by the checks are invalid, or in test situations.

6.18 Tagging

6.18.1 The system shall include a comprehensive function for tagging of Pipeline system devices. It shall support definition, handling, and presentation of several tag types.

6.18.2 The significance of the different tag types shall be entirely defined by the Employer. The tag information is used for operator presentation but can also be used by other applications.

6.18.3 Tagging shall be conveniently combined with work order and interlocking to enhance the operation and security of the Pipeline system, for instance, by blocking hazardous control actions.

6.18.4 Several tags may be set for the same object. These tags would normally be of different types. However, it shall be allowed to set the same type of tag several times for an object. This may be used when tagging an area, that is, pumps areas.

6.18.5 When tags are entered for an object, the date and time, operator identity and a comment text for each tag shall be stored in the database.

6.18.6 The tag information shall be presented in the following ways:

6.18.7 *In single line diagrams*

a) A tag can be placed near the symbol for an object, for instance a valve or adjacent to a pump or a station name.

b) The user defines the layout of each tag type as well as the position of the tag on the single line diagram.
c) Different tag types are assigned different priorities, and each has a different appearance when presented.
d) If more than one tag is set for the same object, only the tag with the highest priority will be visible.

6.18.8 In a dedicated list showing all currently defined tags Tag display lists are sorted by tag type and may be grouped within each type by:

a) Device Identifier
b) Station Name
c) Date and Time

6.18.9 Each setting and removing of a tag is registered in an event list.

6.18.10 The list of tags associated with a Pipeline system device may be displayed by placing the mouse cursor over the device symbol on a display, calling up the command menu (right mouse button), and selection of the "tag" poke point.

6.18.11 It shall be possible to enter a message by the operator associated with each tag.

6.18.12 It shall be possible to set an expiration time when creating a tag and there should be an alarm created when time expires.

6.19 Calculations

The SCADA with the Pipeline Efficiency Management System will be expected to carry out calculations of various parameters.

6.19.1 *Pipeline Efficiency Calculation*

6.19.1.1 Pipeline Pump optimization determines the optimum pump line-up and pressure/ pump speed set points at each station.

6.19.1.2 The following are the key features:

a) Minimization of pipeline running cost.

b) Provision of pump line up and station pressure
c) Calculation of pump power consumption
d) Inclusion of pump maintenance schedule
e) Availability of pump operating curves
f) Feasibility check of scheduled operations
g) Planning of cost-efficient operations.

6.19.1.3 Power Pump Calculation

6.19.1.4 The following types of calculations shall be available in the SCADA Power pump Calculations function as part of pump optimization:

a) Apparent Power
b) Current
c) Power Factor
d) Integration
e) Absolute Difference
f) Active power
g) Reactive power
h) Voltage and kilowatt-hour.

6.19.1.5 There shall be two different ways of specifying a calculation: Interactively in a form display or through the data engineering.

6.19.1.6 In a Real-time Calculation Menu, it shall be possible to block a function. In the form picture, it shall be possible to block only one of the calculations.

6.19.1.7 The calculations shall run cyclically. To achieve high performance the references to the input/output values shall only be fetched once. Therefore, the function must be restarted each time a calculation has been changed, added, or deleted. This shall be done automatically when the function is blocked and de-blocked. If it is impossible to perform a specified calculation, the calculation shall be blocked, and an alarm shall be generated. If the error is caused by the operator, an event shall be generated. Only the erroneous calculation shall be blocked.

6.19.1.8 A general dead band for updating shall be specified for each type of calculation. It can then be selected to use the dead band per calculation or not. The engineering unit prefixes shall be checked for every single value included in the calculation. Therefore, the calculations shall include any type of engineering units (V, kV, W, MW, A, kA etc.)

6.19.1.9 Calculations shall not be ambiguous to the incidence of division by zero.

6.19.2 *Real-time SCADA Value Calculations*

6.19.2.1 Real-time SCADA Value Calculations shall be available for control room personnel and system engineers. The following features shall be provided:

a) create new calculation with advanced algorithms.
b) edit calculation including algorithms.
c) block/unblock execution of calculation.
d) deleting calculation.

6.19.2.2 The defined Real Time Calculations shall be cyclically executed on the online SCADA server with individually defined time intervals.

6.19.2.3 The calculation engine shall provide the following possibilities:

a) Possibility to perform array operations – a general expression can be used to perform the calculation with individual elements of the array.
b) Use of loops (for, while), control flows (if, else if, case) or comparison operators (>, >=, <, <=, ==).

6.19.2.4 It shall be possible to store intermediate results in local variables in the calculation package. If the result value is going to be written back to the database an object to store the result must exist.

6.20 System Start-up

Program start-up shall be accomplished in different ways:

7.20.1 *Manually from an Operator Dialog*

In a first step, a Pipeline system object is selected. Then in a second

step the program is selected from a list of available programs per object.

7.20.2 *Event controlled start*

The program start can be connected to a status change of an indication or a measured value.

7.20.3 *Poke Point*

The program start-up can be connected to a poke point.

7.20.4 *Timer controlled start*

The program can be started cyclically or at a predefined time execution.

7.20.5 *Start-up from the Interlock function*

The Interlock function contains rules for the objects in the system. Command, data entry, and tagging on an object is only possible if the rule corresponding to the object in question is fulfilled. Otherwise, the Interlock function must prohibit the requested changes.

7.20.6 *Manual Data Entry*

A start can be connected to a manual data entry on an object.

6.21 Equipment Statistics

6.21.1 An equipment statistics function shall be included in the system that can be used to minimize the expenses for maintenance of switchgear and other equipment. It shall provide statistics of operations of individual devices and of hours of operations of, for instance pumps.

6.21.2 As a result, maintenance does not have to be scheduled at regular intervals but rather according to the anticipated wear of the equipment.

6.21.3 *Types of Statistics*

6.21.4 There are three types of Equipment Statistics required:

a) Count of operating hours is a cyclic function.
b) A counting of the classified time of state is another cyclic function only for measured values.
c) The range of the measured values is divided in pre-defined levels.

d) Each level represents a factor to calculate the time of state.

6.21.5 During system start, independent of whether it is a cold or warm start; No Equipment Statistics data shall be initialized. Initialization shall be done by the operator using the complete object identification on a display.

6.21.6 All data relevant for the Equipment Statistics function shall be listed in the complete object identification environment.

6.21.7 *State Transition Counting*

6.21.7.1 For a device that shall be considered in the equipment statistics the transition to ON/OPEN or OFF/CLOSED shall be counted. Furthermore, it shall be adjustable by data entry to count only the transitions from OPEN to CLOSE if desired.

6.21.7.2 The function shall distinguish between controllable and non-controllable devices, where a controllable device can be controlled from the Application Server. For each device, an effective wear shall be calculated.

6.21.8 *Count of Operating Hours*

6.21.8.1 The amount of time an object is in a well-defined state shall be counted.

6.21.8.2 This state is “ON”, “OFF” or “ALARM” and it is acquired either directly from the object itself or from assigned objects or measured values respectively.

6.21.8.3 A pump is, for example, defined as “OFF”, when the assigned discharge valve has been recorded as “CLOSED”, or when the assigned measured values (FLOW RATE) are below 5% of their nominal value.

6.21.8.4 The cyclic function shall start at an adjustable interval, for example, every three minutes.

6.21.9 *Count of Classified Time*

6.21.9.1 For this kind of statistics, the following information is required:

a) A measured value must be assigned to a specified level that is related to its nominal value.

b) The number of levels (1...8) shall be defined through data entry. In addition, the borders of these levels are defined through data entry either in absolute values or in percentage of the nominal value.

c) The time interval T_{cycle}. A measurement dwells in one of these levels. The cyclic function starts every x minutes.

7 HISTORIAN

7.1 Historical Data Processing

7.1.1 The SCADA system must support history management allowing data collected and stored to be managed in a structured way for future retrieval.

7.1.2 The stored data can be used for trends and reports or future use in enterprise applications.

7.1.3 For the purpose of history management, “storage groups” are defined. A storage group specifies:

a) Which process variables and alarms are subject to historical recording.

b) The way information about these sources is to be collected.

c) The way information is to be stored.

7.2 Collecting information

7.2.1 The first step in historical recording is to collect significant information. This requires the specification of those sources of information that are of interest. In the case of alarms, for example, only those alarms coming from a specific group may be of interest. In the case of process variables,

only the (historical) changes in value of a few specific process variables may be required.

7.2.2 Apart from specifying the sources (elements of the storage group), the method of collection must also be specified (collection type). Two types of collection are supported:

a) *Scan-based*
At fixed intervals. A "snapshot" of the elements is taken at regular frozen for an instant and the values of the specified sources are collected.

b) *Event-based*
The new value is only collected when a change is detected in the value of a selected source (i.e., when an event has occurred).

7.3 Storing information

7.3.1 The collected information is stored in a database files on disk. The order in which the information is stored in files is determined by the storage type. Four storage types are supported:

a) *Time-based*
Time-based storage means that all information collected at a particular moment is put "together" in the database. This type of storage is directly related to scan-based collection where all collected information is stored in a cube.

b) *Item-based*
This is a more "intelligent" means of storage. All information related to an item is stored in an organized way. As a result, retrieval of historical data for a given item is relatively simple.

c) *Event-based*
This type of storage is strongly related to event-based collection as each event is stored chronologically.

d) *Direct*
The direct storage is used when the connected field equipment stores history information, and the data is collected with long intervals (Dial Connections) or the history is collected from the field equipment and

stored directly into the SCADA history databases.

7.3.2 Two types of direct storage are supported event based and item based. The event-based storage will store a sample with its time tag, the item-based storage assumes a fixed interval and will store only the samples.

7.4 Averaging history values

The average value of an item can be stored for scan and time-based storage groups. Two averaging methods can be specified.

a) *Normal*

The stored value is the result of the accumulated sample value over the specified averaging time divided by the number of samples.

b) *Difference*

The stored value is the result of the accumulated difference of the previous samples during the specified averaging time divided by the number of samples.

7.5 Storage period

7.5.1 The period for which information is stored in one database file shall be configured by the system administrator. When this period elapses, the database file is closed, and a new file is opened automatically.

7.5.2 The storage time shall be synchronized with the GPS time of the system.

7.6 Backup

7.6.1 All history information must be able to be stored on disk. To prevent the disk from filling up, the storage units must eventually be removed.

7.6.2 The Contractor shall therefore define a “lifetime” for storage units.

7.6.3 At the end of this lifetime, the storage unit can either be backed-up or deleted automatically. Before backup-up/deletion, however, a warning is given to the system administrator that a specific unit will be removed

after a period. The warning can be specified by the system administrator and appears at configurable time before backup/deletion of the unit.

7.6.4 A back-up procedure enables specify only the storage group and the period to be backed up. All units used during this period will be backed up automatically.

7.6.5 Image of disks and systems shall be backed up using appropriate tools to be supplied with the system.

7.7 Restore

7.7.1 The archived data can be restored from the backup medium back onto the system.

7.7.2 The operator can use the restored data transparently in trends, reports etc. Also, current data and restored data can both be available on the system for statistical evaluations, yearly reports, or any other kind of report.

7.7.3 To process all types of historical information within a utility, a comprehensive set of functions shall be available.

7.7.4 The processing of all historical data shall be performed on a separate set of redundant servers and shall be based on a relational database. Any commercially available SQL tool shall be possible to use.

7.8 Database Server Application Programming Interface (API)

7.8.1 An access shall be provided by means of a dedicated secure connection service, that sets up an ad-hoc query, transports the query to the database server, performs the defined operations and sends the result back.

7.8.2 This general-purpose service can access all data in the real-time database and in the historical storage. It shall support a distributed database concept and shall make data available to any application in any external computer.

7.8.3 The API shall support login with authority handling and shall allow the start of application programs in the control system.

7.9 ODBC, DAIS and OPC Interfaces

7.9.1 An ODBC (Open Database Connectivity) standard interface, proposed by Microsoft for accessing data shall be provided.

7.9.2 The interface shall permit maximum interoperability, a single application can access different database management systems. This allows an application developer to develop, compile, and ship an application without targeting a specific DBMS.

7.9.3 Users shall be able to add modules called 'database drivers' that link the application to their choice of database management systems.

7.9.4 The ODBC interface shall be available in PC-environment to access data using the system ODBC driver.

7.9.5 The system shall support connection to OPC servers and hence support data acquisition based on OPC DA.

7.10 Redundancy

7.10.1 It shall be possible to configure the SCADA control system in a flexible manner to meet the high availability with Quadra redundancy, which shall be supported by SCADA System.

7.10.2 Each application server can be configured with at least two standby servers forming a 'server group'. The degree of redundancy can be chosen depending on the importance of the applications.

7.11 Supervision of the Control System

7.11.1 The Supervision of the Control System shall include a set of activities that supervises the status of the control system.

7.11.2 It shall detect hardware and software failures and configures of the system to maintain critical operations.

7.11.3 The supervision of the control system shall primarily operate at the level of the individual devices in the system. However, as the status of these individual devices influences the operational capabilities of the whole or parts of the control system, the supervision shall also include system aspects.

7.11.4 These aspects shall be handled by the subsystem supervision. In this context subsystem is a set of interdependent devices, which can include redundant devices for on-line and standby operation so that the subsystem is robust with respect to device failures.

8 HUMAN MACHINE INTERFACE FEATURES

8.1 The User Interface – Main Features

The User interface shall have the following features:

a) High performance. Ergonomic interaction design for efficient usage

b) Fast to learn and easy to use.

c) On-line help that provides fast and easy to use user guidance for new and low frequent users.

d) Minimum of actions needed to invoke a dialog or a function via menus and pop-up dialogs. Accelerators, also named short cut commands shall be available for most operations.

e) Online customizable: highly configurable, possible to make on-line user specific changes of menu contents, accelerators, colors, and many function-controlling parameters by configuration dialogs without any custom programming.

f) Scalable in functionality, i.e., use of an internal interface based upon plug-in component technique to be easily extended and integrated with other IT systems in the utility.

g) High inter-application consistency. Following user interface standards

h) High functionality. Integration of third-party products like spread sheets and real time trend packages.

i) Low bandwidth requirement, i.e., very fast picture call up times of real time process information.

j) High scalability, i.e., use of the same process displays on the web, without any engineering effort.

k) The User Interface shall combine support for demanding real time process operations with openness of the MS Office application world.

l) Zoom, stepwise, continuous and by extent.

m) Support of Full Graphics features:

- Pan, smooth by scrollbars and overview drag.
- De-clutter, 32 de-clutter levels
- Named Layers

8.2 Extendibility

The HMI shall be designed to be adaptable to changes in requirements to meet future needs.

8.3 Configurability

The HMI shall provide the possibility to create system wide or own personal toolbars and menus. New icons and toolbars shall be added after commissioning of the system without any compilation or linking.

8.4 Document Integration

The HMI shall support the integration of different document types. A document type is beside the traditional dynamically updated process pictures for example HTML based documents.

8.5 Access Security

8.5.1 The HMI shall control the access to the system by:

- User Verification (authorization). The verification shall be based on unique User Identification (User ID)
- Each user shall be assigned Roles and Authorizations base on Segregation of duties and Governance, Risk & Compliance (GRC) best practise.

8.5.2 The authorization shall be accomplished by using a login procedure.

8.5.3 A login account shall be blocked if multiple unsuccessful login attempts are performed.

8.5.4 Passwords shall expire after a predefined time and must be changed regularly as per specification on this tender.

8.5.5 *Operator Login*

a) To use an operator workstation, the operator must log in by entering a username and a password.

b) When logged in, the operator shall get the responsibilities given by the authority areas of the operator workstation and the personal authority areas depending on the definition of authority in the current system.

c) Login/Logout actions shall be logged in the event list together with number of the operator workstation and the operator's User ID.

d) During the entire work session, events generated due to important actions taken by the operator are marked with his UID.

8.5.6 *Shift Change Login*

It shall be possible to perform a shift change login with the addition that the new user inherits the authority as per user configurations.

8.5.7 *Operating Jurisdictions*

a) The HMI shall support an extensive and flexible authority concept.

b) The authority, assigned to an operator, shall control what operations can perform by that operator. In some applications the authority will filter information presented to the operator.

8.5.8 *Dynamic Operation*

A Dynamic Operation function shall be available that allows on-line reassignment of authority between operators as for example moving the authority between dispatch centers for night and daytime operation. It can also be used for temporary reallocation of authority of a part of the network at disturbances.

8.6 User Interface Design

8.6.1 *The System Information Areas*

The HMI Interface shall provide an information field that allows system communication between the operator and the system. This information field shall always be visible and accessible by the user and shall comprise at least the following parts:

a) *Menu Bar* shall contain:
   - Pull-down menus for miscellaneous local and external functions.

- Menus that are easy to configure to meet specific customer needs, e.g., create a new Picture Window, perform a Picture Select, capture screen contents, and save as a bitmap, Print hardcopy of the screen.

b) *Toolbar*: fast access, including frequently used functions

c) *Alarm Icon:* indicates if there are unacknowledged alarms in the system. The Alarm Icon shall also be a toggle button for the presentation of the Alarm Window.

d) *Silence Audible Alarm Icon:* button to be pressed to silence audible alarms.

e) *System Clock:* This field contains the system date and time.

f) *Dynamic Function Keys:* that can be used to call up specific pictures or to start functions.

g) *Any other function as may be deemed necessary by KPC.*

8.6.2 *Document Window*

a) Inside the HMI main information frame, document windows shall be used to present picture documents. These document windows shall be used to present for example the following types of pictures:
   - World maps
   - Single line diagrams
   - Reports
   - Trend curves
   - Alarm and event lists
   - Tabular for displaying the results of analysis programs.

b) Each document window shall include a title bar and scroll bars. All document windows shall be individually resizable and shall be controlled by standard functions like Tile and Pane.

8.6.3 *Document Window Functions*

a) The standard window management functions of the operating system shall be used. These functions are common to all types of windows in the system. They shall always behave the same since they are handled and executed by the window manager.

b) The following window functions shall be available:

- Create Picture Window
- Make Picture Window Active
- Drag-and-drop picture and window call-up.
- Push and Pop Window
- Move Window
- Re-size Window
- Minimize (Icon for Window)
- Maximize (Full Size Window)
- Close Window
- Open and Close the Overview window
- Capture a window and save as bitmap.
- Print a hardcopy of a window.

8.6.4 *Operator Settings*

An "Operator setting" function shall be available that makes it possible to restore the HMI operator station window, menu and toolbar set up at login to what it looked like at logout.

8.6.5 *Window and Display setup*

Each operator shall be able to save up to six settings of graphics picture windows. These settings can be restored by a menu selection. In addition, one of the settings may be defined as default setting. This default setting of windows shall automatically be restored at operator login.

8.6.6 *Personalized Menu and Toolbar setup*

Each operator shall be able to have an own personalized menu and toolbar configuration. It shall be possible to set up the HMI in such a way that each operator may do on-line modifications of own menu, popup, and toolbar settings.

8.6.7 *Collaborative Functional Screen Capability*

The SCADA shall support a collaborative dashboard capability that allows integration of information from all kinds of data sources such as video streaming (CCTV, CAMs), URL (Internet/Intranet), databases, spread sheets, pdf documents, etc. These sources shall be available as standard

components that can be utilized in mimics and dashboard views with minimal configuration effort.

8.6.8 *Mobile HMI Clients*

The System shall support Mobile HMI client application for mobile devices such as Tablet computers, Smart Phones and PDA. Which do not require any Java VM to run native HMI applets.

8.6.9 *Play back functionality for Operator Training and Analysis*

The SCADA system shall have capability to record operator actions and play them later when required for operator training and Analysis.

8.6.10 *Alarm and Event Processing*

8.6.10.1 *Audible Alarm Annunciation*

a) Events may be defined to start an Audible Alarm Annunciation with jurisdiction to start the audible alarm annunciation.

b) An Audible Alarm Annunciation shall be silenced by clicking on the silence icon or by pressing a predefined accelerator key in the keyboard.

8.6.10.2 *Picture Alarm Annunciation*

a) Objects in Unacknowledged state shall be indicated in pictures by having a flashing red colour.

b) Acknowledge of alarms within the jurisdiction shall be done in the following ways:
   - From the Alarm List picture presentation, by selecting, one, several or a whole page of lines.
   - From a Process picture presentation by selecting one or several objects in alarm state
   - From a Status List Tabular by selecting, one, several or a whole page of lines.

8.6.10.3 *Alarm Window*

The Alarm Window shall contain the date/time, identity, and reason of alarm description of the latest objects that entered the unacknowledged alarm state within the actual jurisdiction.

8.6.10.4 *Locate of Alarm Objects*

By use of a Locate function, it shall be possible to navigate from a line in the Alarm Window and from the Alarm summary list to a picture presenting the actual object.

8.6.11 *Operator Notes*

8.6.11.1 *Operator Initiated Messages*

a) It shall be possible to enter unrestricted messages in operator notebooks that exist at the system, subsystem, and station levels. Notes and messages can be entered for temporary documentation of 'work in progress,' 'shift take-over information', etc. The time of entry shall automatically be stored together with the message.

b) The operator can add an optional activation time, cyclic or non-cyclic, to a message. At the time of activation, the message shall be distributed to operator workstations as alarm and printout. The distribution shall be limited to the operators concerned with the corresponding part of the system.

c) It shall also be possible to produce a printout report on the contents of the notebook.

8.6.11.2 *Operator Note Texts*

a) Free format operator notes, comprising any available character on the alphanumeric keyboard, shall be temporarily appended to HMI pictures, for instance, a single line diagram. A note can consist of several lines. It can also be distributed to various positions on the picture.

b) When the notes become obsolete, they can be deleted with a single menu command.

c) In addition to the facility to add notes on various pictures, a "scratch pad" picture shall be available to the operator. This initially blank picture can be used by the operator for entering information that has

no relation to any specific picture or when the information is too long to be stored in an ordinary picture.

8.6.11.3 *Operator Note Symbols*

a) It shall be possible to place a "Yellow post-it" styled Operator Note symbol in any HMI file.

b) When clicked on such a note symbols, a dialog shall be presented where the user can view and edit texts and pixel graphics. Pixel graphics shall be entered by copy and paste from the clipboard.

c) A Notes summary picture shall contain a list of all notes in the system. Each row shall contain the picture name to which the note is attached, the creation date, the login name of the user that created the note, last change date, the login name of the user who most recent changed the note, and the content of the note's comment field.

8.6.11.4 *Operator Notebook*

The Operator Notebook shall be a picture reserved to be used as a scratch pad/blotter for free text notes and operator notes symbols.

8.6.12 *User Interaction*

8.6.12.1 Dialogs shall be supported to manage windows, to select pictures, and to select data shown on pictures.

8.6.12.2 Dialogs shall always be carried out with reference to pictures. All devices and data to be explicitly affected by a dialog must be displayed in the picture in the dialog window as dynamic data.

8.6.12.3 Dialogs for different purposes such as, manual data entry, tagging, command, regulation, locate, etc. shall be supported.

8.6.12.4 *Supervisory Control Initiation*

a) Command functions shall be provided for either the Pipeline system process or the control system. They shall be used in different situations, as for example to:

– Open/close Pipeline system objects, e.g., a valve.

- Switch-over between Auto and Manual control modes of regulatory objects,
- Activate/deactivate control system devices.

b) Because of this the command dialog boxes shall have different looks, depending on what it is, they control.

c) A command shall have two alternatives (ON/OFF) corresponding to the two possible physical states, which exist for a Pipeline system object or a control system device.

8.6.12.5 *Locate*

a) A locate function shall be available that enables the user to quickly locate network components within the current operating diagram or globally through any alarm or event list or a dedicated dialogue.

b) Several methods shall be supported to identify the object to be located:

- The object can be selected before activating the Locate function. It can be selected from any dynamic picture element or from a line in the alarm or event list.

- The object identification can be entered manually in a dialog box.

- The object can be selected from a list, built in advance by a filter function.

c) The filter function fills a list of objects that match a search pattern entered by the operator. Wild cards are supported.

d) The search range can be reduced by selection of a component type:
- Station
- Motor
- Pump
- Indication
- Line
- Flow

- Measurand
- Station
- Tank

8.6.12.6 *Pointing out the Located Object*

The located object shall be highlighted, or an arrow will point at the located object with brief description of object. The result is presented for a default time of 5 seconds.

8.6.12.7 *Tagging*

a) A tag is a method of bringing to the attention of other operators and the system itself that an object currently has a special status e.g., section under test. This may relate to work in progress or other abnormal conditions in the process.

b) It shall be possible to set several tags for the same object but only the tag with the highest priority will be displayed.

c) Each operator, who has control authority for an object also shall have the authority to set and remove tags for that object. Tags can be set for the following types of objects: objects represented as indications, pumps, valves, tanks, etc.

8.6.12.8 *Time Select*

A Time Select dialog shall be provided that is used for selecting a time to which the time is connected when time navigation is performed.

8.6.12.9 *Navigation in time*

To be able to navigate in time, for example in an event list, three buttons previous time, next time and exit time selection in the toolbar shall be provided.

8.6.12.10 *Playback*

A playback function shall be provided that can be used when the operator wants to view how some special object values in the single line diagram have changed during a time-period.

8.6.12.11 *Value Select*

a) A Value Select dialog shall be provided that allows the operator to view alternative sets of value types in a single line diagram. Through this feature, results from various pipeline applications can be presented.

b) The value types to be selected amongst are determined by the PMS functions included in the system. The different value types for PMS functions can be:
   - Minimization of pipeline running cost.
   - Optimal Flow
   - Measured (Real time)
   - Measured (% of nominal values)
   - Interlock Calculated
   - Pipeline flow Simulation
   - Security Analysis
   - Security Constrained Dispatch

8.6.12.12 *Instant Trend*

a) An Instant trend function shall be provided that can be called up from picture. Any singular measured analog element could be selected for instant trending.

b) When an instant trend is called up, it shall obtain the current value of the data being referenced from the database at the current time.

c) The trend shall fill in with time, and once the graph is full, the oldest values will scroll off as the newest value scrolls on.

8.6.12.13 *Picture Selection*

a) A Picture Selection function shall be available that is used to display pictures in the presentation window on the active screen. A selection shall be checked for valid authority before presentation.

b) The following functions shall be available:
   - Menu Selection

- Pictures can be selected from a configurable list of pictures in the menu bar. They can also be selected from a file selection box.

- Push Button Selection

- Any picture can be assigned to a push button in any other picture. Positioning the cursor on the push button and performing a “Select” will select the picture. Menu pictures are examples of pictures with such selection push buttons.

- Dynamic Function Key Selection

- A picture selection function can be assigned to a dynamic function key. As dynamic function keys are defined for each picture, the same principle as for poke point selection is valid. A dynamic function key selection is performed by a mouse click on the button on the screen or by pressing the corresponding keyboard accelerator keys.

- Picture Name Selection

- Any picture can be selected by typing its picture name into a Picture Select dialog box.

- Recall Picture Selection

- A stack of the 20 last displayed pictures is maintained. The pictures are available in a menu list, which is updated with the latest displayed pictures. By drag-and-drop, the recalled picture may be presented in any of the picture windows.

- Back and Forward Picture Selection

- Picture navigation using back and forward arrow toolbar buttons. The buttons contain a list of pictures to enable long back and forward jumps.

- Drag and Drop Picture Selection

- A picture selection can be requested so that the picture is presented in another window than from where it was requested.

8.6.12.14 *Picture Updates*

a) When a new picture is selected, all dynamic data fields shall be initialized to their current database values. While a picture is displayed, indication changes shall be updated automatically.

b) Measurement changes that do not pass limit or a zero dead band are updated on a cyclic basis. The update cycle shall be determined by the source of the value and the current operational situation. Cyclic updating shall be possible also for specified general numerical values.

8.6.12.15 *Inactivity Timeout*

All user operations shall be monitored. If a multi-step dialog involving a selection of an object in a picture is not completed within a preconfigured time, then the dialog shall automatically be closed.

8.6.12.16 *User Guidance*

The system shall respond by a visual or audible confirmation of all user actions to give feedback on that the user has performed an action. An example of such a response is the change of cursor symbol.

8.6.12.17 *User On-line Help*

a) The HMI shall have a specific context sensitive on-line help system. User access to this help shall be available by:
   - A Help command in the window menu bar
   - A Help button in dialog boxes
   - A Context sensitive question mark icon that can be pointed at various places.

b) The on-line help shall provide the following navigation aids:
   - Content
   - Index
   - Search
   - Favourites

8.7 Full Graphic Functions

8.7.1 *Zoom*

A Zoom function shall be provided that is used to enlarge/diminish the currently viewed part of a selected picture. The following types of zooming functions shall be available:

a) Incremental Stepwise Zoom
b) Continuous Smooth Zoom
c) Zoom Area
d) Zoom Home

8.7.2 *Pan*

A Pan function shall be provided that is used to select a certain area of the picture without changing the zoom level. The following panning functions shall support:

a) Stepwise Panning

This function can be used both in the main and in the overview window. Positioning the cursor at the center of the interesting area and then executing the function invoke it.

It is also possible to pan by dragging the frame in the overview window. The pictures are re-drawn with the new center at the same zoom and de-clutter level.

b) Smooth Panning

Smooth panning is achieved by using the mouse drag picture function and by using the window scroll bars.

c) Overview Panning

8.7.3 *De-clutter*

8.7.3.1 De-clutter shall be used to control the presentation of static and dynamic elements at the different zoom levels. Up to 32 de-clutter levels shall be available of which one is used for information to be presented in the navigation overview window. Pictures can be designed to maximize their effectiveness at all zoom levels:

a) By removing static and dynamic elements that have become too large or too small due to zooming
b) By adding information that is relevant to a specific zoom level.

c) By dividing pictures in separate parts. Each part can be defined to be presented at a specified de-clutter level.

8.7.3.2 All picture elements shall be associated with de-clutter levels to add and remove picture elements when moving from one zoom level to another.

8.7.3.3 One incremental zoom step shall give a one-step change in the de-clutter level.

8.7.3.4 When selective zoom is executed, the de-clutter level shall correspond to the next higher zoom level.

8.7.4 *Layers*

8.7.4.1 Layer presentation shall be available as a complement to de-clutter used to control the presentation of different information types. For example, layers can be used to control presentation of different voltage levels independent of zoom. Another example is to present or hide geographical information like roads in geographically oriented process pictures. The selected layer presentation shall be valid on all de-clutter levels.

8.7.4.2 It shall be possible to define which layers to be presented at a picture call-up. Presentation of a layers can be switched on and off in an on-line dialog box.

8.7.4.3 *Overview Navigation Window Chain*

To maintain the overview while seeing detail information in a large and deeply zoomed in picture, a chaining of windows shall be supported in such a way that one window can be the overview window for another window. This shall be possible in several levels. In case a pan or zoom is made in one of the chained windows, the other windows shall be updated accordingly.

8.7.4.4 *AutoCAD Background Layers*

It shall be possible to display static drawings in a subset of the AutoCAD file format as background pictures. AutoCAD layers shall be switched on and off in an on-line dialog box in the same way as other picture layers.

AutoCAD layers shall be configured to be presented from a predefined de-clutter level.

8.7.4.5 *Advanced Graphics Support*

Selectable Presentation Area

It shall be possible to define a picture cut-out as a rectangle in world coordinate units. When calling up a picture with a defined cut-out, an automatic zoom area to the given cut-out is made as a part of the picture call up.

8.8 Picture Types

8.8.1 Pictures shall be divided into a number of logical groups in order to impose a structured overview of the pictures and to facilitate fast access to any picture. Examples of such groups are:

a) World Maps
b) Single Line Diagram
c) Event List
d) Alarm List
e) Sequence of Events
f) Status List
g) Trend curves
h) Reports
i) Notebook
j) Component based documents.

8.8.2 *Picture Hierarchy*

8.8.2.1 Pictures shall be assigned to a picture hierarchy to facilitate the organization and selection of many pictures.

8.8.2.2 The picture selection structure shall have three levels:

a) System level
b) Subsystem level
c) Station level

8.8.2.3 The hierarchy shall be used, for instance, when making an extract from an event list. If a system level picture is selected when the event list is called up, the event list will contain all events from that system level. Had the event list instead been called up while having a station picture displayed, the event list would only contain the events of that station.

8.8.3 *Import of World maps*

8.8.3.1 The network control system shall support incremental and total import of data from NIS (Network Information System) or GIS (Geographical Information System). These types of systems shall be used as the primary network extension planning and documentation tool and feed the supervisory control system with network data. This means that the data already defined in planning shall be used and no redundant input of data is necessary. This procedure is normally called GIS Import.

8.8.3.2 A GIS, or NIS, system shall normally export, at least, data describing:

- Pipeline system objects, e.g., valves, pumps, etc.
- Topology based on node numbers or names, connecting the objects.
- World maps (schematic and geographic) with dynamic elements, referring to Pipeline system objects.

8.8.3.3 Some GIS systems can deliver well-organized increments when changing the master database. Others can only deliver total copies of the new database. The provided World map GIS import shall be able to handle both cases.

8.8.4 *Single Line Diagrams*

8.8.4.1 Single Line Diagrams shall show the configuration and dynamic state of the Pipeline system, subsystems, and stations. They shall be presented in a schematic way with static information and dynamic objects.

8.8.4.2 The static information shall represent lines, pumps, tanks, and names of devices in the Pipeline system. The dynamic objects shall show device states and numerical values for product flows, pressures and other measured or calculated values of the Pipeline system. The Dynamic

Colouring function shall be used to present coloured lines and pumps indicating status, pressure levels, etc.

8.8.4.3 A single line diagram picture shall show detailed information from one station only or it shall show an overview of many Pump stations and their interconnections.

8.8.4.4 Pipeline system devices shall be controlled through Single Line Diagram pictures.

8.8.5 *System Pictures*

8.8.5.1 System Pictures shall have the same features as Pipeline system pictures but shall provide status information of the control system itself.

8.8.5.2 The configuration and status of the control system shall be presented in configuration pictures. Devices and their connections shall be shown as static information while the states of these devices are represented as dynamic objects. Various tests of the HMI equipment can be initiated from a set of pictures. The applications within the system have their own setup of pictures through which the operator monitors and controls the function and for certain applications can view the result.

8.8.6 *Information Pictures*

8.8.6.1 An information picture shall be a tabular picture presenting detailed information about a specific object in the database. Information pictures shall be available for many types of objects in the control system, both physical objects in the Pipeline system and logical objects within the control system. Information pictures shall be automatically generated, showing all relevant parameters and values associated with a selected object, when selecting an object and requesting the information picture.

8.8.6.2 Some of the parameters and data presented on the information pictures can be modified by means of Manual Data Entry. All items that can be modified shall be shown as input fields of the type that is normal in PCs.

8.8.7 *Status List – Database List Extract*

8.8.7.1 A scrollable list extract function shall be available for dynamic filtering and sorting of Event, Alarm, and general database tables.

8.8.7.2 The definition of the extract filters shall be made from on-line dialogs. Extract definitions can be named and saved and called up by name. An optional tree structure with all available queries shall be used for navigation purposes without having to open extracts by name or pushbuttons. The filter queries shall be defined using syntax for producing extracts of general database tables.

8.8.7.3 The list extract function shall include an on-line style browser. This style browser shall be used when defining style templates used to control things like fore, background, grid, and header colours and font families and font sizes.

8.8.8 *Dynamic Quality Coding*

8.8.8.1 The colour and flashing state of numeric values shall represent their status and may be defined on group or on individual object basis. Status includes limit violations, alarm acknowledgment status, and data quality status. Numeric values in their normal state shall be presented with the defined default colour.

8.8.8.2 In addition to the colour state, a dedicated symbol shall also be presented for each status either before or behind the value itself.

8.8.9 *Attribute Functions*

The layout of the static and dynamic elements shall be controlled by a set of basic attribute functions:

a) Palette colour selection
b) Line attributes selection of line style (solid, dotted, dashed, width, etc.)
c) Fill attribute selection of fill pattern for circles, boxes, and polygons
d) Text attributes selection of font, size, and orientation.

8.8.10 *Static Background*

8.8.10.1 Any combination of symbols, graphics, and text shall be used to define the static background. Each static background element can be defined with any combination of available picture attributes, flashing excluded.

8.8.10.2 Built-in functions shall be included to facilitate the design of the static background includes Freeline®, Polyline, Line, Box, Square, Circle, Arc, Text, Pixmap® elements etc.

8.8.10.3 These functions shall also be used when creating symbols to be used by dynamic elements.

8.8.10.4 Pixmaps shall be imported in PNG and BMP formats. The PNG format supports background transparency.

8.8.11 *Conditional Presentation*

The presentation of dynamic data elements shall be defined to be conditional. In other words, the element may be entirely suppressed due to the status of any control variable (on/off) in the database.

8.8.12 *Push Buttons*

8.8.12.1 It shall be possible to associate any available function – for example, a picture selects, or a program start up – with a click on a push button. A push button can be defined at any location on the picture that does not coincide with other dynamic objects. A push button shall be visually identified on a picture by a 3D styled push button surrounding an arbitrary symbol or text string.

8.8.12.2 It shall then be possible to do a pre-zoom and pan in combination with the picture selection. Adding an optional parameter string in the push button definition shall do this.

8.8.13 *Presentation of Analog Values*

Analog values from the database shall be presented in different formats:

a) *Numeric presentation*
Any numeric value in the database, including measured values, accumulated values, calculated values, set points can be presented in this form.

b) *Bar Chart presentation*
A Bar Chart is a form of analog presentation. Its length, width and degree of filling define it.

c) *Meter/Dial presentation*

The current value is shown by the position of an arrow along a value axis.

d) *Pie Chart presentation*

The current value is shown by the filling degree of a pie chart. The Pie can be 90, 180, 270 or 360 degrees.

e) *Filled polygon.*

- The current value is shown by the degree of filling.
- The filling is done from bottom to top.
- The degree of filling is controlled by the current value relative its nominal value. For example, a filled polygon can be used to show the water level in a profile of a lake.
- One of these alternatives shall be defined as the default at picture presentation. The definition is made on an individual object basis.
- The default selection may be changed in an on-line dialog on picture basis.

8.8.14 *Presentation of Discrete Data*

8.8.14.1 Discrete data from the database shall be presented in two ways:

- Symbol presentation
- Integer number presentation

8.8.14.2 Symbols and text strings shall represent the different states of flow and telemetered system objects that have discrete behaviour.

8.8.14.3 A discrete object shall have 16 different presentation states where each state can be represented by its own unique symbol or text-string. The colour and flash characteristics of the symbol or text string shall represent the internal status of the object, that is, alarm acknowledgment status and data quality status. The symbol or text string and colour shall be defined on a group or individual basis. Consequently, different discrete objects shall have different presentation conventions for representing their state.

8.8.14.4 The flash convention for each state shall be included in the colour definition. In addition to the colour status, a dedicated symbol shall be

presented by defining an additional element for each internal state, either before or behind the symbol or text string.

8.8.15 *Presentation of Text Data*

Dynamic text objects shall be defined in the database and linked to pictures.

8.8.16 *Time Presentation*

Four sub-fields shall present time. The order of the sub-fields can be customized.

8.8.17 *Historical Trend as picture element*

A Historical Trend function shall be integrated as an ordinary picture element.

8.8.18 *XY-Plot Presentation*

8.8.18.1 A XY-plot function shall be provided to draw polylines and symbols in the picture at dynamic locations specified by a dedicated application program. Plotting shall be possible in up to four quadrants.

8.8.18.2 The XY-plot shall be used to draw polylines, i.e., connect values calculated by a dedicated application, or polymarkers, and i.e., draw symbols, at the position specified by the same application program or by static data.

8.8.18.3 The polylines and the polymarkers shall be drawn within the ranges (x and y) specified in the XY-plot element. A XY-plot curve is a polyline or a number of polymarkers. One XY-plot element can contain multiple XY-plot curves. The mixture of polylines and polymarkers in one XY-plot can be chosen freely.

8.8.18.4 The XY-plot can be connected to a cyclical update. Whenever the cyclical update occurs the complete XY-plot, with all the polylines and polymarkers, is re-drawn.

8.8.19 *List Presentation*

8.8.19.1 List presentations shall show lists with variable length, where each row in the list corresponds to a single list element in an associated database list.

8.8.19.2 The maximum number of rows displayed at the same time corresponds to the size of the presentation window. However, the lists themselves can be longer than the size of the presentation window.

8.8.19.3 The following standard lists shall be available:

- Alarm and Event lists
- Sequence of Events Lists
- Status lists
- Operators Notebook lists.

8.8.19.4 It shall be possible to view lists using toolbar icons and popup menu selections for paging, top/bottom selection and scrolling up and down 3 lines per selection.

8.9 Tabular Presentation

8.9.1 The HMI Interface shall have an integrated commercial grid component for presentation of tabular data. This component shall be used also to present application data in tabular format.

8.9.2 Quality prefix and colour information shall be fetched with each object if that information exists for that object and shall be presented in tabular type of presentations as foreground colour on the font and as a character prefix.

8.9.3 *Tabular Report Management*

All management and configuration of tabular reports shall be made through on-line dialogs via menus including opening and saving of reports to and from the Network Control system.

8.9.4 *Tabular Run-time Dialogs*

A run time dialogs shall allow the operator to perform various functions. Some examples of runtime dialog functions are:

a) Clipboard support – It shall be possible to use Cut, Copy and Paste operations to and from the Windows clipboard.

b) Cell copy by drag of frame – It shall be possible to copy the content of one cell to neighbor cells by Excel like cell frame drag. If the source cell is non-numeric, then the target cells shall be pasted with the exact content as the source cell. If the source cell is numeric, then the target cell n (n is the number of cells from the source cell) gets the numerical value of the source cell increased by n.0

c) Cell formatting – Windows styled Cell formatting shall be supported for numeric and date/time presentation.

d) Cell coloring – Color information shall be determined by quality codes and shall be sent with the values from the server. Also, a quality code prefix shall be used for each value.

e) Cell alignment – Windows styled Cell alignment Left, Right and Wrap shall be supported.

f) Integer status to symbol in cell – A cell shall be able to contain symbol information from the HMI Interface symbol library.

g) In cell full-page data entry – It shall be possible to enter several cells in one commit operation.

h) Cell data entry validation – Validation of cell data shall be supported. The validation shall be done in the server at “Commit” of a range of cells.

i) Cell data entry of date/time – Date and time shall be possible to enter by using a date/time picker. The entry shall be done from a pop-up dialog.

j) Cell data entry of discrete symbol table status – Cell data entry of discrete symbol table status shall be made from the values in the symbol table. The entry shall be done from a pop-up dialog.

k) Filter – It shall be possible to filter the current selection. The filtering shall be performed on the server side and includes possible information.

l) Search – It shall be possible to Search in the current selection. The search shall be performed on the server side and includes possible information.

m) Sort – It shall be possible to sort the current selection. The sort shall be performed on the server side and includes possible information.

8.10 Historical Trend presentation

8.10.1 A Historical Trend function shall be used for presentation of historical data in curve diagrams. There shall be two possible ways to implement a trend in the HMI Interface:

a) The Historical Trend function shall be integrated as an ordinary HMI Interface picture document. That is, it can be presented in the same window that has previously contained a process picture or a menu picture. It opens embedded in the operator workstation and not in a separate application window. For rapid picture navigation to other pictures (trend and other HMI Interface pictures), the trend document shall support dynamic function keys like any ordinary picture document.

b) The Historical Trend function shall be integrated as an ordinary HMI Interface picture element. That is, it can be presented as a picture element in a picture with other types of picture elements.

c) The Historical Trend function shall be implemented as a picture document and shall be configured to retrieve the object to trend via an element select. This function shall be named Default Trend. Default Trend means that a default trend shall be configured with all data given (log, interval, etc.) except the object to log. The object shall be instead retrieved by an object selection prior to selecting the popup menu option Default Trend. It shall be possible to show up to 6 Trend diagrams in one picture and up to 16 curves in each diagram.

d) Quality coding shall be supported in terms of if, for example, there was an alarm condition or if the value was marked as invalid at the time of sampling. If the log has the alarm condition state logged, the alarm condition shall be presented as a dynamic colour overriding the default colour. The number of values possible to trend shall be in principle unlimited and only restricted by storage space.

8.10.2 The Trend Curve function shall be based on a commercial state of the art real time trend package that support showing up to 6 curves, each with its own value axis, or up to 16 curves with one common Y-axis.

8.10.3 For each curve, it shall be possible to select, colour, line type, line width, point colour, point type, point size, time offset, if alarm presentation is desired, minimum, and maximum values for the value axis.

8.10.4 Functional features required:

a) *Auto Scale*: The minimum and maximum values of the value axis automatically shall be adjusted to the actual values of the trend curve.

b) *Grid*: A grid pattern shall be included in the diagram

c) *Zoom*: The trend area shall be zoomed to show more details

d) *Exact Reading*: Shall show the exact value of each object in the trend for each time.

e) *Single/Multi Graph*: Shall show several curves in one diagram or one curve per diagram in a scrollable list of diagrams.

f) *Filled or Unfilled Curve*: It shall be possible to select between filled and unfilled curve presentation.

g) *Time select*: It shall handle previous, next, set time operations in the trend.

h) *Presentation Type*: Linear or Logarithmic presentation.

8.10.5 *Online trend configuration*

a) The configuration of the trend diagram shall be made from easy-to-use on-line configuration dialogs.

b) The trend attributes shall be of two major types:

- What to present

- How to present it

c) What to present shall be controlled by the Object filter dialog presenting the objects possible to trend. How to present the information shall be controlled by the Trend presentation property dialog. In the Trend presentation dialog, for example the following presentation properties can be controlled:

- Font styles, font colours and font size
- Curve style
  - ✓ Line (colour, line style, thickness, polymarkers)
  - ✓ Bar (plain, 3D, and/or shadowed)
- Background colours and bitmaps

8.11 Time Controlled Picture Printouts

Pictures, including other picture documents, shall be configured as printed cyclically on timer basis. The printout shall be a screen dump of the corresponding window view as seen in the HMI Interface.

8.12 Spreadsheet Integration

8.12.1 A standard spreadsheets function shall be available in the system It shall be for example possible to use Microsoft Excel spreadsheet reports for real time and historical data both in combination with the HMI Interface.

8.12.2 It shall also be **important** to export and import Tags as .CSV or any other format in Microsoft Excel.

8.12.3 With the spreadsheet function it shall be possible to present multiple items for a data object with a specified layout in the picture document. Multiple objects from multiple data sources shall be specified in a single spreadsheet. The spreadsheet presentation shall be used to present data in a tabular and business graphics spreadsheet form, change database data, produce reports, as well as to print out reports. It shall also be used to perform calculations, directly and by using scripting languages. Spreadsheet printouts can be printed manually on demand and automatically on timer basis.

8.12.4 All management and configuration of spreadsheet reports shall be made through on-line dialogs via the spreadsheet menus including opening and saving of spreadsheet reports to and from the control system.

8.12.5 The configuration settings of spreadsheet reports shall be made in an on-line configuration dialog.

9 PERIPHERAL UNITS

The HMI Interface operator workplace shall be basically equipped with a standard PC keyboard, and a cursor locator device, usually a mouse.

1.1 Display Monitors

1.1.1 HMI Interface shall support PCs with up to four (4) full graphics screens each with up to 1600x1200 pixel resolution per screen or better. However, 1920x1080 shall be recommended for readability reasons.

1.1.2 It shall be recommended to have the same resolution on all operator workplaces in a system because the configuration settings shall be adjusted to the used resolution. The HMI should support both the SCADA and other applications.

1.2 Audible Alarm Units

1.2.1 Alarms from the Pipeline system or control system may activate an audible alarm. The following types of audible alarms shall be supported:

a) Multimedia type of digitized sound using wave files and built in or external PC speakers.

b) External USB connected

1.2.2 The choice of Pipeline system objects that activate audible alarms shall be made via the selection of alarm processing groups. In addition, the events initiating audible alarm can be limited by means of a priority scheme.

1.2.3 The distribution of alarms to different alarm devices shall be primarily controlled by the dynamic authority assignment of the operator workstations. In addition, it can be limited according to the subsystem classification of the event.

1.3 Hardcopy Printer

1.3.1 A Hardcopy device shall be used for printout of a copy of an HMI Interface screen or an HMI Interface picture window to any printer at the user's choice. The hardcopy function does not inhibit the operator station from normal usage during the printout. Multiple hardcopy requests can be queued to a printer. A Hardcopy printout shall be printed on a colour or black and white printer device.

1.3.2 When printing a hardcopy of a HMI Interface picture, a special hardcopy colour palette shall be used enabling white background and foreground colours to be adjusted to the white background.

1.4 Report Printers

1.4.1 Report printouts shall be normally managed by LAN connected printers.

1.4.2 Each application shall be assigned to a logical printout type. Each logical printout type shall be assigned to a specific printer. When a printer failure is detected, the printout types that shall be assigned to that printer shall be automatically directed to a backup printer.

1.5 Large Screen Displays

It shall be possible to use the HMI Interface with Large Screen Displays. Typically, there shall be an HMI Interface running in the Large Screen Display Controller PC. By enabling the predefined Large Screen Display toolbar on the local workstations in the control room, the cursor and the picture interaction with the HMI Interface on the Large Screen Display shall be enabled.

a) The Large Screen Display wall shall act as a large desktop. Typically, the HMI Interface, installed in the Large Screen Display Controller, shall be configurable with a special large screen user and pre-configured windows (1-4) by the operator settings function.

b) A large screen picture request shall be one at the time performed from any of the workstations installed in the control room. Two types of interaction shall be supported:

- Move the local cursor to the large screen desktop.
- Copy a picture from the local desktop to the large screen by clicking a toolbar button.

1.6 Video Images

The HMI Interface operator station shall allow for presenting real time, and recorded camera inputs in own windows on the desktop of the PC console.

1.7 Control Room Furniture

1.7.1 Desks shall be designed in accordance with ergonomic standards:

a) ISO 11064 Ergonomic design of control centers – Part 4: Layout and dimensions of workstations

b) ANSI/BIFMA Ergonomic Guidelines G1-2002

c) ISO 9241 Ergonomic Requirements for Office Work – Part 5: Workstation Layout and Postural Requirements

1.7.2 The operator desk shall be for 24-7 environments typically and shall endure four times the exposure of traditional office furniture.

1.7.3 The Contractor shall be required to participate in the planning phase to relate and accommodate local and logistical related activities. This shall include the sizing of all the desks, screens among.

1.7.4 Ergonomic features shall include and not limited to:

a) The operator console shall have a motorized function that allows the operator to easily adjust the angle of all screens simultaneously; in addition, the depth and height of the monitor board is adjustable[1].

b) The application HMI shall be fully integrated with the SCADA HMI.

c) To reduce the operator fatigue; the operator desk shall be easily adjustable to alter between sitting and standing work positions. The operator desk shall be motorised and easily adjustable from 650 to1300 mm (25.6” to 51.2”) to accommodate various heights of the operators.

d) The operator shall be able to adjust functions, such as sitting/standing position, light conditions, and the distance to the screens as well as the angle of them to best suit their individual ergonomic needs.

e) The large overview monitors shall be adjustable in height to always remain in view regardless of the physical size or working position of the operator.

f) To ensure a high ergonomic standard it is important that the operator shall have the required legroom beneath the operator desk.

g) A large overview shall be important to be able to monitor the process as a whole but it shall not be placed too far from the operator; a personal large overview shall be preferred so that the operator has access to the information needed and can work interactively with the large overview screen.

h) The operator desk shall have some form of armrest or soft edge to the desk to improve the working environment for the operator.

i) The desk shall be preferably interactive and have the possibility to manoeuvre through the interface.

j) The desk shall allow for comfortable and sufficient legroom, free of protruding parts or sharp edges that may cause irritation, injury, or damage.

k) Side boards in a modular construction for a 24/7 centre to facilitate future re-arrangements that may occur, and it shall be sufficient to change the side boards to control the individual angles between different operator desk ensembles as follows:
   - Possible directions of movement.
   - Altering between sitting and standing, 650 to1300 mm
   - Possible ergonomics directions of movement when using Close Large Overview support.

l) High quality of the console and all components is vital so that the console shall withstand daily wear and tear and sustain a high standard throughout its lifetime.

m) Computers shall be stored in the remote location because of the heat, noise, and vibrations they cause, therefore Contractors should clearly demonstrate solutions to enabling placement of computer workstations in a remote location.

n) To reduce desk clutter and operator confusion; there shall be one operator keyboard that can control all screens and workstations of the console.

o) The desk shall be easy to clean beneath, from both the front and behind without obstruction.

p) Light shall be LED lighting and shall be integrated in the operator console and provide the whole working area with the same luminance.

q) The light shall be dimmable between 900 Lux to 1800 Lux or any range as agreed.

r) The light shall have a colour rendering index RA of at least 85 %.

s) The light shall not cause glare in neither the desktop nor the screens, no matter the angle of them.

t) A sound shower (directed sound) element shall preferably be built into the operator console to prevent daily communication disturbing the adjacent operators working in the control room.

u) A public sound speaker system improves safety in a critical situation by sending out alarms and instructions therefore it shall be preferred if a PA system is integrated in the console.

v) To reduce disturbing noise within the control room there shall be noise absorbing solution integrated in the console.

w) The operator monitors shall be of the new 16:9 format and support full HD.

x) The large overview and the smaller monitors shall have the same format so that moving images and documents between screens is possible without distortion.

y) All screens both big and small must be produced for 24-7 usage to minimize the risk of burn-in effects from static images.

z) All monitors shall have motorised and synchronized angle adjustable from -5 to +45 degrees.

aa) The monitors shall be of the size 23-24".

bb) A large overview is important to be able to monitor the process but it shall not be placed too far from the operator; a personal large overview shall be preferred so that the operator has access to the information needed and can work interactively with the large overview screen.

cc) The large overview shall be dynamic as opposed to static.

dd) A frame shall be placed around the large overview both for aesthetics purposes and for minimising surrounding visual distractions. Preferably this frame shall be covered in sound absorbing material.

ee) The large overview shall be height adjustable to follow the height adjustments of the desk and enabling operators to present overviews to the adjacent operators.

ff) To reduce desk clutter and operator confusion; there shall be one operator keyboard that can control all screens and workstations of the console.

gg) The keyboard shall have hot keys and/or functions keys to reduce "clicks" and reduce the time consumption for the operator especially in critical situations.

hh) The keyboard shall easily be able to switch between the different client PCs.

ii) The operator desk/console shall have a user's/maintenance manual.

jj) The operator desk/console shall have an installations manual.

kk) The supplier shall have the necessary competence to be able to provide a complete solution for an ergonomic, functional, and pleasant environment, this includes lighting and sound. There shall be a possibility to view the supplier's products beforehand in a demo centre.

ll) The construction of the operator desk must meet the Machinery Directive for CE approval and documented in the form of a binder or available digitally on delivery.

1.8 System Operation and Support Functions

Performance requirements on system operation and support functions shall include failure protection and initialization and update. The required frequency or elapsed time for the activities for normal loading conditions are listed below.

1.8.1 *Start-up*

a) *SCADA server cold start*
Time from last command in start dialog until the start menu is refreshed: <400 s

b) *SCADA server warm start*
Time from last command in start dialog until the start menu is refreshed: <300 s

1.8.2 *Switch-over*

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The times have been measured on the *reference system:*

- Time to start Data Engineering tool: <10 s
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- Time to link a single line picture in the reference system: <10 s
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10.8.2 *Switch-over*

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10.8.3 *Data Engineering*

The times have been measured on the *reference system:*

- Time to start Data Engineering tool: <10 s
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- Time to link a single line picture in the reference system: <10 s
- Time to link a world map picture (REF_SYS) in the reference system: <10 s.

11 ONLINE UNITERRUPTIBLE POWER SUPPLY (UPS) REQUIREMENTS

11.1 General Requirements

This clause specifies the typical specifications for the Supply, Installation and Commissioning of Uninterruptible Power Supply (UPS) that meets power requirements of all equipment/systems in the Equipment room, Control Room including the SCADA and all associated system under this Contract.

11.1.1 *Online Double Conversion VFI*

11.1.1.1 The Topology of the UPS must be VFI (Voltage and Frequency Independent accordingly with classification mentioned in the EN-IEC62040-3 Standard), to guarantee filtered and stable output voltage to the load, **independently from the input voltage.**

11.1.1.2 This means that the output is obtained by two converters in cascade. The first converter rectifies the AC input voltage, the second converter (Inverter) transforms the DC voltage, coming from the

rectifier, in AC voltage to supply the load. This double conversion allows to completely clean eventual disturbs from the mains.

11.1.1.3 In case of anomalies in the input voltage, the DC voltage, which supply the Inverter, can be obtained, thought a booster circuit, from batteries. In this way the output is always guaranteed with continuity. In case of overloads or faults, the automatic static by-pass guarantees the load supply.

11.1.1.4 In the event of an AC power failure, the UPS will automatically transfer to battery power and continue to provide power without any interruption for the full amount of time you select. When power returns, the UPS will automatically recharge the batteries for the next unexpected power outage or disturbance.

11.1.2 *Scalability*

The modularity of the UPS must allow to increase the back-up time on site, simply adding battery drawers. The upgrade will not require factory modifications and will not need dedicated special tools.

11.1.3 *Features*

The line-interactive system channels the incoming mains power, via an Automatic Voltage Regulator, directly to the load. Compared to off-line, the system can handle much larger voltage variations before switching to battery operation.

11.2 Technical Specifications

11.2.1 *Reference standards*

Unless otherwise specified, the supply shall conform fully to the following standards, but not limited to these only:

EN 62040-1-1	Uninterruptible power systems (UPS) Part 1-1 General and safety requirements for UPS used in operator access areas;
EN 62040-1-2	Uninterruptible power systems (UPS) Part 1-2 General and safety requirements for UPS used in restricted access locations;
EN 62040-2	Static uninterruptible power systems (UPS)

	Part 2 Electromagnetic compatibility (EMC) requirements;
EN 62040-3	Static uninterruptible power systems (UPS) – Methods of specifying the performance and test requirements
EN 50272-2	Safety requirements for secondary batteries and battery installations – Part 2: Stationary batteries;
EN 60896-11	Lead acid stationary accumulator batteries. General requirements and methods of test. Part 1: Vented types.
EN 60896-21	Lead acid stationary batteries, part 21: valve-regulated types – Test methods;
EN 60896-22	Lead acid stationary batteries, part 22: valve-regulated types – Requirements;
EN 60146-1-1	Semiconductor converters – General requirements and line commutated converters – Part 1-1: Specifications of basic requirements
EN 60950-1	Information technology equipment – Safety Part 1: General requirements.
ISO 3746	Acoustics – Determination of sound power levels of noise sources using sound pressure – Survey method using an enveloping measurement surface over a reflecting plane.
EN 60529-2 (Europe).	Protection levels of enclosures (IP rating).
ASTM	D999 and D800 and AFNOR NF H 00-042. Transportability and resistance to vibration, inclined planes and tipping over.

The UPS to which this specification relates must carry the CE mark, in accordance with directives on safety and radio interference (2006/95/CE Low Voltage Directive and 2004/108/CE EMC).

11.2.2 *UPS Specifications*

11.2.2.1 Each single UPS shall comprise the following sub-assemblies:

- rectifier;
- battery charger;
- battery bank;
- inverter;
- automatic bypass,
- Maintenance bypass.

11.2.2.2 *UPS General Characteristics*

The uninterruptible power supply shall meet the following minimum essential technical specifications:

Technology		Should be digitally controlled, IGBT based double conversion On-line VFI according to IEC62040-3 specification
		Built-in Isolation Transformer should be provided on the Inverter output (No External IT will be accepted)
		Input & output EMI Filter should be provided
Power	Ratings (kVA)	At least 50 kVA
	Topology	Double conversion
	Electrical Input	
	Nominal input voltage	240V single-phase
	Input voltage range	±10% from nominal at 100% load without depleting battery
	Operating frequency	50Hz
	Waveform	Sine wave
	Input power factor	>0.99 typical
	Input current distortion	5% THD

	Electrical Output	
	Nominal output voltage	240 VAC, 24VDC, 48VDC
	Output voltage regulation	±1% static; ±5% dynamic at 100% resistive load change, <1 ms response time
	Overall Efficiency	> 91%, typical
	Inverter Efficiency	> 93%
	Heat dissipation (BTU/hr)	Be minimal
Protection	Normal Protection	Input, output, rectifier input, battery fuse, bypass fuse, short circuit etc. Thermal on system, rectifier, bypass and inverter. Protection against prolonged battery discharge
	Back feed protection	The back feed protection should be installed in series with bypass SRCs.
Battery	Battery type	12V, sealed, maintenance-free
	Battery runtime	Contractor to indicate
	Recharge time	< 7hrs
	Battery replacement	Field-replaceable
Charger		Default is 3.4A per battery string. Charger current is configurable from 0.5A to 25A per string with an overall maximum of 34A (limited by input current)
	Start-on-battery	Allows start of UPS without utility input
General	Diagnostics	Full system self-test at start-up
	UPS bypass	Automatic on overload or UPS failure
	Parallel for	Yes

	redundancy	
	Dimensions and weights	Contractor to indicate
	Overload (normal operation)	150% for 5 sec
Communications	LCD display	Graphical LCD with blue backlight
	LEDs	(4) LEDs for notice and alarm
	Audible alarms	Yes
	Communication ports	Industrial Ethernet Port
	Communication slots	(2) X-Slot communication bays
	Power management software	Contractor to include
Environmental	Operating temperature	10–60ºC
	Relative humidity	0–95%, non-condensing
	Audible noise	<56 dBA
Certifications	Safety certifications	IEC 62040-1-1, IEC 60950, EN 62040-1-1, UL 1778
	EMC compliance	EN 50091-2 Class A
	Quality	ISO 9001: 2000 and ISO 14001:1996

11.2.3 *3-level IGBT rectifier*

The UPS unit's rectifier must be made with IGBT technology throughout with DSP (Digital Signal Processor) control.

Technology and topology of the bridge rectifier	IGBT 3 level
Rated voltage	240Vac 1ph
Voltage tolerance	+/-20% up to -40% at partial loads without using the batteries
Rated frequency	45 – 65 Hz

Input power factor	≥ 0.99
Total harmonic distortion (THDi)	≤ 2.5 % without active or passive filters

Active and passive filters may not be used to prevent resonance and slow protection equipment response.

11.2.4 *IGBT battery charger*

11.2.4.1 The system must include one or more battery chargers:

- with IGBT technology;
- separate from the rectifier;
- with charging voltage independent from the DC bus voltage;
- dedicated and independent for each accumulator bank;
- maximum recharge current at least 13 Amp;

11.2.4.2 The battery charger must be able to operate with the following types of accumulator:

- Lead acid, hermetically sealed
- Lead acid, vented
- NiCad

11.2.4.3 Depending on the temperature, the battery charger shall be able to select the most suitable recharge method automatically, without operator intervention, alternating float mode in combination with "intermittent" charge in such a way as to limit the effects of corrosion (plate sulphation) and significantly prolong battery life.

11.2.4.4 The maintenance charge voltage must be automatically regulated in relation to the temperature of the battery compartment.

11.2.4.5 The battery compartment must be equipped with a temperature sensor for this purpose.

11.2.4.6 The following parameters must be adjustable and configurable:

- maximum recharge current limit;
- constant float mode current and voltage;
- Switching threshold from fast recharge mode to maintenance mode.

11.2.4.7 The battery charge regulation and control circuit shall also provide the following functions:

- continuous monitoring of the battery circuit (battery interrupted) with visual alerts on the local user interface;
- monitoring of battery efficiency, via partial discharge at settable intervals; the check consists in continuously monitoring the discharge current and comparing it with the ideal discharge curve;
- Continuous monitoring of the battery charger's output voltage to ensure it remains within the limits required to optimize battery life. Recharging voltage anomaly alerts followed by deactivation of the charger;
- Residual battery capacity display.

11.2.5 *Batteries*

14.2.5.1 The stationary accumulator bank will comprise lead acid valve regulated sealed batteries / lead acid vented batteries / NiCad batteries complete with metal enclosure as follows:

- It must comply with all European standards and directive required for CE marking;
- It must be made with a metal structure able to support weight and mechanical stress during transport;
- It must be rated at least IP20 (if it has a door, it must be rated IP20 even with the door open);
- The UPS must be connected to the battery enclosure via their front panels for ease of installation, inspection and maintenance;
- The battery enclosure must be equipped with suitable circuit breakers and protection equipment which are also appropriate for the UPS to which it is connected;
- The enclosure must have a RAL7012 wrinkle finish grey coating on all externally visible parts;
- To simplify maintenance of the accumulator banks and access (visible and otherwise) to the circuit breakers, protection equipment and connectors, the enclosure must be completely accessible via a door in its front panel;

14.2.5.2 The accumulator bank must have an expected service life of 5 years with a capacity of 8 hours at 100 % load.

14.2.5.3 The runtime in terms of the unitary power output factor must also be clearly stated.

11.2.6 *3-level IGBT inverter*

11.2.6.1 The inverter will be equipped with an IGBT switching circuit (PWM type) to convert the rectifier or battery DC voltage into AC, and an output filter rated to create the output voltage envelope. The inverter will be digitally controlled via DSP.

11.2.6.2 The inverter must be able to deliver the rated power at the rated voltage and frequency and the following output specifications:

Inverter technology and topology	IGBT 3 level
Load management at rated power	Any load, from 0.1 inductive to 0.9 capacitive
Rated active power specified on UPS ratings plate, in accordance with EN 62040-3	Contractor to specify
Permanent maximized active power at 35°C in accordance with EN 62040-3	Contractor to specify
Stable voltage in static operation with input in the admitted range and load variation from 0 to 100%	± 1% Vn
Stable voltage in dynamic operation with input in the admitted range and load variation from 0 to 100% and vice versa	Compliant with IEC/EN 62040-3, Class 1 (VFI-SS-111)
Distortion of voltage waveform at linear rated load	≤1.5%
Distortion of voltage waveform with non-linear rated voltage as per IEC/EN 62040-3	≤5%

11.2.6.3 The inverter is equipped with its own output current-limiting logic, so that components are not damaged in the event of a short- circuit.

11.2.6.4 In the case of UPS units configured in parallel, the inverter is protected by a combination of electronic circuitry and fuses.

11.2.6.5 The system will indicate the following situations affecting the inverter: general maximum temperature warning, with subsequent shutdown of the machine; uncoupling of frequency generator from auxiliary power source; tripping of power circuit fuses.

11.2.6.6 The inverter must be connected to the load (in both single and parallel configurations) via a contactor to permit galvanic separation of the circuits.

11.2.6.7 In battery mode, a stability of ± 1% of the output voltage value must be maintained to the minimum battery voltage.

11.2.6.8 The inverter must be able to automatically open the battery circuit to prevent damage in case of slow discharge.

11.2.7 *Automatic bypass*

11.2.7.1 A static bypass must be installed in parallel with each inverter (for both single and parallel installations) to provide:

- Automatic load transfer without interruption to the standby power supply in case of :
  - ✓ overload;
  - ✓ out of tolerance inverter input DC voltage;
  - ✓ over-temperature;
  - ✓ inverter fault;
- Automatic transfer from standby circuit to inverter when normal conditions are restored, and verification of the inverter parameters.

Phase-neutral short circuit capacity with power available for 20ms	20In
Transfer time with inverter synchronous with	No interruption

bypass	
Maximum overload: • permanent • for 20 minutes • for 10 minutes • for 2 minutes	 110% 125% 150% 200%

11.2.7.2 The UPS must continuously monitor the standby power supply parameters (voltage, current and frequency).

11.2.8 *Maintenance bypass*

11.2.8.1 The manual bypass switch will be provided internally and must ensure that equipment downstream of the UPS is supplied directly by the UPS upstream power source when rectifier, inverter and static switches are open.

11.2.8.2 Switching to the manual bypass and back will be MBB, possible without load supply interruption (Make Before Break).

11.3 Conformity to standards

The system must conform to the following standards:

- Safety: EN62040-1.
- EMC emissions: EN62040-2.
- EMC immunity: EN62040-2 class C2 and C3.

11.4 Construction specifications

All items of equipment must be assembled in one or more modular cabinets, manufactured to the following specifications:

- Enclosure in steel sheet assembled (without welding) with tri-lobe thread forming screws for improved reliability and vibration resistance.

- Colour RAL 7012 grey with wrinkle finish, polyester epoxy powder coating for its excellent mechanical characteristics, resistance to chemical agents and aging;

- The enclosure must be able to bear the loads to which it is subject during shipping, as well as vibration, impact and dropping (per ASTM D999 and D800, AFNOR NF H 00-042);

11.5 User interface, controls and alerts

11.5.1 *User interface*

11.5.1.1 The user interface on the UPS must be composed of a colour graphic display as follows:

- Minimum size 3.5";
- High visibility screen;
- Reinforced protection against accidental impact.

11.5.1.2 The interface must provide the following controls/alerts:

- synoptic electrical diagram of the UPS;
- Language: English, with localized installation and user manual.
- There must be a USB port for downloading the event/alerts log.
- Display of the following parameters:
  - ✓ input and output voltages;
  - ✓ input and output currents;
  - ✓ input, output and auxiliary frequency;
  - ✓ battery voltage;
  - ✓ total and remaining battery capacity;
  - ✓ battery charge / discharge current;
  - ✓ apparent and active power;
  - ✓ output load
- Statistical and graphical measurement of:
  - ✓ capacities less than 2 minutes, from 2 to 5 minutes, and greater than 5 minutes;
  - ✓ output load;
  - ✓ overload less than / greater than 5 seconds;
  - ✓ loss of redundancy;
  - ✓ internal and battery temperature;
  - ✓ Time of operation.

11.5.2 *Alerts via terminal block contacts*

11.5.2.1 The system will also enable remote indication of the following status or alarm information via the terminal block contacts:

- general alert;
- normal mains operation;
- battery operation;
- bypass mode;
- battery draining;
- low battery charge;
- over-heating;
- Overload / loss of redundancy.

11.5.2.2 The following input commands must be remotely controllable via the terminal block:

- external emergency shutdown with the following functions:
  - ✓ shut down the UPS;
  - ✓ open the static bypass;
  - ✓ disconnect the logic and batteries;
- handle external alerts;

11.5.3 *Remote Communications*

11.5.3.1 The UPS will be able to communicate with the central control system via:

- a programmable data I/O card with at least 7 voltage-free contacts for input data (at least 3 contacts) and output data (at least 4 contacts);
- at least 3 serial com ports, including one RS232, one RS485 and one Ethernet;
- Ethernet port with the following communication protocols which must be supported:
  - ✓ SNMP;
  - ✓ MODBUS over TCP/IP;
  - ✓ HTTP;
  - ✓ SMTP;
  - ✓ PROFIBUS;
- The system must be able to send SMS's over a GSM modem, to report particularly important alerts and events.

11.5.3.2 The configuration must be settable via the HTML interface.

11.5.4 *Remote serial alerts and commands*

11.5.4.1 The interface must be able to display at least the following status or event information:

- general alert;
- battery mode with mains supply / no mains supply;
- normal operation (inverter in-line);
- static bypass operation;
- residual capacity in battery mode;
- battery low charge warning;
- battery on fast charge;
- abnormal battery recharge voltage;
- minimum battery voltage;
- battery fault;
- battery charge circuit broken;
- battery charger system fault;
- overload alert;
- ventilation fault alert;
- out of range temperature/humidity alert;
- standby power supply out of tolerance;

11.5.4.2 A predictive/statistical algorithm and interpretation of logged data (number, duration and type of events) regarding:

- out of tolerance Input voltages;
- overloads;
- battery mode operation;
- switching to standby power supply;
- over-temperatures.

11.5.4.3 The UPS must predict potential criticalities for the UPS itself, due to ambient conditions, in advance and alert the maintenance service / monitoring system.

11.5.4.4 Other requirements:

- silence able acoustic alarm;
- second remote sensor to monitor the enclosure/battery room/other room temperature and humidity;
- Lamp test circuit to verify the system's operation.

11.5.5 *Diagnostics*

11.5.5.1 The system will be equipped with a microprocessor able to run full machine diagnostics to determine:

- self-compensation of components to ensure stable settings over time;
- acquisition of the main diagnostic and monitoring information by computer (local or remote);
- first installation procedure wizard;
- full test procedure at full load on UPS, with no further external loads (auto-charge mode)
  - ✓ rectifier;
  - ✓ inverter;
  - ✓ bypass;
  - ✓ power bus;
  - ✓ cables, contactors and fuses;

11.5.5.2 The Manufacturer must also supply 24h remote monitoring and maintenance.

11.6 Installation

11.6.1 Following supply and installation of the equipment, commissioning shall be carried out by technicians in the employ of the UPS manufacturer or authorized by him.

11.6.2 The following must be completed at this stage:

- system connections check (positioning and accessibility of UPS, mechanical inspection, ambient conditions, connections and protection equipment, configurations).
- check availability of all necessary documentation.
- service trials.
- validation of measurements made during factory testing.
- test on load.
- Installation and verification of remote data transmission to control station.

11.6.3 The technician must submit a full report and installation certificate on completion of commissioning.

11.7 Tests and service trials

11.7.1 KPC reserves the right to run service trials in the manufacturing plant of the UPS to be supplied, in accordance with the lists listed in CEI EN 62040-3.

11.7.2 The tests, run by the supplier at their own expense, with a representative of KPC in attendance, includes the following steps:

- documentation check
- design, fabrication, and installation check
- interconnections
- instrumentation check
- options description
- description of synoptic panel
- rectifier static performance
- battery and charger performance
- inverter static regulation
- inverter overload (with resistive load)
- inverter dynamic regulation
- bypass transfer test

11.7.3 All tests must be conducted with appropriate instrumentation with valid calibration certificates.

11.7.4 Following a positive outcome of the testing procedure, the manufacturer will issue the relative certificate listing the tests conducted and the results obtained.

12 ENERGY METERING DEVICES, PROTECTIVE RELAYS, SOFTWARE AND CONNECTIVITY REQUIREMENTS

12.1 Introduction

12.1.1 KPC has installed Variable Frequency drives and standard motors spread across the pipeline. The variable drives installed is as follows:

a. Rockwell Drives: PS3, PS9, PS11

b. Schneider Drives: PS21B
c. Siemens Drive: PS7
d. Telmec (Toshiba) Drives: Line V (PS14, PS1, PS3, PS5, PS7)

12.1.2 The Power Meter monitors the critical aspects of an electrical distribution system. This premier power quality metering instrument should be simple to use, powerful, scalable and highly flexible. The Power Meter shall offer a new level of intuitive user interface design, present critical electrical distribution system information in simple to navigate and easy to understand information architecture.

12.1.3 The Power Meter graphic display shall visualize the information from meter modules. The Power Meter shall have an embedded Web server to display complex power quality data using standard Internet browsers and allow for device configuration from the browser. Both the local graphic display and the embedded Web server shall present real time, historical and event information in a browser style graphical format to help the user interpret key circuit information, such as:

- Current loading
- Voltage and power levels
- Power factor
- Energy usage
- I/O status
- Power quality measurements
- Harmonic plots
- Disturbance and transient waveforms

12.1.4 *Graphic Display*

The Power Meter graphic display shall use a simple “twist and click” navigation control dial to easily navigate the menus and drill down into increasing levels of important detail. A “back” key to enhance the browser like navigation of the graphic display.

12.1.5 *Web server*

The Web server shall provide the energy and demand readings required to help manage the cost of energy. It shall also provide critical information regarding power quality, such as harmonic distortion, flicker, crest factor,

K-factor and more.

12.1.6 *Web Server Device Configuration*

- Special software shall not be required to configure the Power Meter.
- The embedded Web server shall include comprehensive device set-up capability.

12.2 KPC Energy Management Requirements

12.2.1 KPC requires the bidder supplies hardware, where existing is inadequate, that shall be compatible to existing infrastructure at KPC stations for purpose of picking and transmitting parameters to supplied SCADA system.

12.2.2 In the SCADA system, all powers consumption parameters shall be possible to trend and will flow-rate demand comparison, the Energy Management Module (EMS) shall automatically compute the best requirements and combinations to run pumps to attain a required flow.

12.2.3 It shall be possible in EMS to warn operator that the calculated parameters have been exceeded and system is not efficiently being run should the operator parameters violate the system computed setpoints.

12.2.4 On a touch of a motor, popup comparison graphs shall be possible in one screen with different pens and colors to show how power, current, voltage etc. have been performing on a selectable time period.

12.2.5 Overall, KPC shall require computational reports on:

- Total energy consumed in a month for all pump stations in EMS.
- Total energy consumed per pump station.

12.2.6 The contractor shall visit all KPC sites where the meters will be installed to get a better understanding of KPC existing infrastructure/ switchboard panels.

12.2.7 The scope shall include engineering, material supply, transport to sites, installation & termination, configuration, testing and commissioning energy meters to communicate with Energy Management Module in

SCADA to ensure all data required for energy management is gathered and comprehensively covered.

12.2.8 The meter shall be supplied with all critical items and accessories that will enable the meter function fully as designed.

12.2.9 The meter shall be designed and sized to monitor Pump Motors that are rated at 6.6KV, 3.3KV and 415V.

12.2.10 The meter shall be of the latest and current technology.

12.2.11 The meter software licenses (if any) shall not require annual subscription.

12.2.12 The meter shall be supplied with laptop for diagnostics, programming, downloading, and inputting data should it be required.

12.2.13 The power meters shall be supplied with proper maintenance tools.

12.2.14 Detailed training for KPC Engineers shall be conducted at the manufacturer's premise as well as during installation at KPC sites.

12.3 Specifications Requirements

12.3.1 **Minimum Requirements for the EMS Platform:**

The tenderer shall be required to propose an optimization platform for oil pipelines. The platform or system proposed shall be capable of at a minimum:

12.3.1.1 Optimizing the Capacity of the Pipeline: the EMS shall be capable of modelling and studying the capacity of the pipelines.

12.3.1.2 Optimizing the Cost of operating the Pipeline: the EMS shall be capable of finding the optimal pump combinations based on power tariffs, power or fuel consumed, or cost of power or fuel to meet capacity flow rate or user-defined target flow rates.

12.3.1.3 The EMS shall have a comprehensive library of modeling components including pipes, pipe fittings, pumping stations, pumps, pump drivers (motor, variable speed drives), supplies/deliveries, junctions, and tanks.

12.3.1.4 The EMS shall have user-adjustable tuning parameters used to facilitate matching of historical data with the EMS pipeline optimization results.

12.3.1.5 The EMS shall provide for a wide assortment of engineering reports, including but not limited to pump combination usage report, pump detail report, and station detail report.

12.3.1.6 The EMS shall provide for monthly cost reports showing electric power consumption/bill for each station, providing analysis, and understanding of complex power consumption parameters.

12.3.1.7 The EMS shall be capable of simulating hydraulic scenarios, balance usage of line assets over time to work around line or unit outages; simulate new or upgraded system assets easily; determine costs of incremental volumes.

12.3.1.8 The EMS shall be capable of studying and assessing costs under different running scenarios.

12.3.2 **Existing Data Collection Points**

The following are the existing data collection points provided for the information of the bidder. The bidder is required to study them and decide whether to factor in the existing equipment or propose new ones for the successful implementation of the pipeline EMS system.

It is the responsibility of the bidder to determine the adequacy of the instrument transformers which are the primary power consumption collection points.

If the bidder determines that new instrument transformers of other power devices are required, the bidder shall determine physical installation and wiring requirements.

12.3.2.1 **Line 1**

No.	**Operating Voltage Level**	**Existing Instrument Transformers**		**Remarks**
		Current Transformers, VA, Ratio	**Voltage Transformers VA, Ratio**	
1-P-101	3,300	3.3kV 500/5-	110V Secondary	**Motor Parameters:**

No.	Operating Voltage Level	Existing Instrument Transformers		Remarks
		Current Transformers, VA, Ratio	Voltage Transformers VA, Ratio	
Panel	Volts	5A Core1-10VA Core2 – 15VA		1760kW 350A, 0.92 pf **Other Devices on the Panel:** Digital Ammeter, Rishabh/AE CT 500/5A 110V, 96 x96mm **Motor Protection Relay,** SPAM 150C which supports Fiber Optic Serial Communication over SPA Bus
1-P-201 Panel	3,300 Volts	3.3kV 500/5-5A Core1-10VA Core2 – 15VA	110V Secondary	**Motor Parameters:** 1760kW 350A, 0.92 pf **Other Devices on the Panel:** Digital Ammeter, Rishabh/AE CT 500/5A 110V, 96 x96mm **Motor Protection Relay,** SPAM 150C which supports Fiber Optic Serial Communication over SPA Bus
1-P-301 Panel	3,300 Volts	3.3kV 250/5A 5VA Class 10P10 250/5A 5VA	110V Secondary	**Motor Parameters:** 1600kW 327A, 0.89 pf **Motor Protection Relay,**

No.	Operating Voltage Level	Existing Instrument Transformers		Remarks
		Current Transformers, VA, Ratio	Voltage Transformers VA, Ratio	
		Class 1		SIPROTEC 7SK8032 (SIEMENS)
2-P-101 Feeder Panel	6,600 Volts	6.6 kV CT 300/5/5/5A 0.5/5P20/5P20 30/30/30VA	$/\frac{6.6kV}{\sqrt{3}}/\frac{0.11kV}{\sqrt{3}}/\frac{0.11kV}{3}/\frac{0.11kV}{3}$ 0.5/3P/3P 30/30/100VA	**Motor Parameters:** 1760 kW, PF 93.5, S1 Rating, 175A **Other Devices on the Panel:** Digital Ammeter, CHINT 6L2-A 300-5A **Feeder Protection Relay,** REX 521 RELAYS **Motor Protection Relay,** MPR 2000/3000 Relay
2-P-201 Feeder Panel	6,600 Volts	6.6 kV CT 300/5/5/5A 0.5/5P20/5P20 30/30/30VA	$/\frac{6.6kV}{\sqrt{3}}/\frac{0.11kV}{\sqrt{3}}/\frac{0.11kV}{3}/\frac{0.11kV}{3}$ 0.5/3P/3P 30/30/100VA	**Motor Parameters:** 1760 kW, PF 93.5, S1 Rating, 175A **Other Devices on the Panel:** Digital Ammeter, CHINT 6L2-A 300-5A **Feeder Protection Relay,** REX 521 RELAYS **Motor Protection Relay,** MPR 2000/3000 Relay
2-P-301 Feeder Panel	6,600 Volts	6.6kV CT 300/5/5/5A 0.5/5P20/5P20 30/30/30VA	$/\frac{6.6kV}{\sqrt{3}}/\frac{0.11kV}{\sqrt{3}}/\frac{0.11kV}{3}/\frac{0.11kV}{3}$ 0.5/3P/3P 30/30/100VA	**Motor Parameters:** 1705KW, 340A FLC, PF 0.91, REV 2979/Min **Other Devices on the**

No.	Operating Voltage Level	Existing Instrument Transformers		Remarks
		Current Transformers, VA, Ratio	Voltage Transformers VA, Ratio	
				Panel: Digital Ammeter, CHINT 6L2-A 300-5A **Feeder Protection Relay,** REX 521 RELAYS **Motor Protection Relay,** MiCOM P225/P123 Relay
3-P-101 Feeder Panel	3,300 Volts	CT 4,5,6 400 / 5A 15VA CL 0.5 & CT 4,5,6 400 / 5A 15VA 5P10	$/\frac{3300}{\sqrt{3}}/\frac{110}{\sqrt{3}}/\frac{100}{3}$V 50VA CL0.5 50VA CL3P	**Motor Parameters:** HITACHI, 3 Phase Induction Motor, KW 1653 Volts 3300, Amps 347RPM 2970, PF 0.875, Made in Japan **Other Devices on the Panel:** **Feeder Protection Relay,** SEPAM M41 which Supports Modbus TCPIP, Modbus RTU, DNP3, IEC 60870-5-103 and IEC 61850 communication protocols
3-P-201 Feeder Panel	3,300 Volts	CT 4,5,6 400 / 5A 15VA CL 0.5 & CT 4,5,6 400 / 5A 15VA 5P10	$/\frac{3300}{\sqrt{3}}/\frac{110}{\sqrt{3}}/\frac{100}{3}$V 50VA CL0.5 50VA CL3P	**Motor Parameters:** HITACHI, 3 Phase Induction Motor, KW 1653 Volts 3300, Amps 347RPM 2970, PF 0.875, Made in Japan **Other Devices on the**

No.	Operating Voltage Level	Existing Instrument Transformers		Remarks
		Current Transformers, VA, Ratio	Voltage Transformers VA, Ratio	
				Panel: **Feeder Protection Relay**, SEPAM M41 which Supports Modbus TCPIP, Modbus RTU, DNP3, IEC 60870-5-103 and IEC 61850 communication protocols
3-P-301 Feeder Panel	3,300 Volts	CT 4,5,6 400 / 5A 15VA CL 0.5 & CT 4,5,6 400 / 5A 15VA 5P10	$/\frac{3300}{\sqrt{3}}/\frac{110}{\sqrt{3}}/\frac{100}{3}$V 50VA CL0.5 50VA CL3P	**Motor Parameters:** 1705KW, 340A FLC, PF 0.91, REV 2979/Min **Other Devices on the Panel:** **Feeder Protection Relay**, SEPAM M41 which Supports Modbus TCPIP, Modbus RTU, DNP3, IEC 60870-5-103 and IEC 61850 communication protocols **Motor Protection Relay,** MiCOM P225/P123 Relay
4-P-101 Feeder Panel	6,600 Volts	6.6 kV CT 300/5/5/5A 0.5/5P20/5P20 30/30/30VA	$/\frac{6.6kV}{\sqrt{3}}/\frac{0.11kV}{\sqrt{3}}/\frac{0.11kV}{3}/\frac{0.11kV}{3}$ 0.5/3P/3P 30/30/100VA	**Motor Parameters:** 1760 kW, PF 93.5, S1 Rating, 175A **Other Devices on the Panel:** Digital Ammeter, CHINT 6L2-A 300-5A

No.	Operating Voltage Level	Existing Instrument Transformers		Remarks
		Current Transformers, VA, Ratio	**Voltage Transformers VA, Ratio**	
				Feeder Protection Relay, REX 521 RELAYS
4-P-201 Feeder Panel	6,600 Volts	6.6 kV CT 300/5/5/5A 0.5/5P20/5P20 30/30/30VA	$/\frac{6.6kV}{\sqrt{3}}/\frac{0.11kV}{\sqrt{3}}/\frac{0.11kV}{3}/\frac{0.11kV}{3}$ 0.5/3P/3P 30/30/100VA	**Motor Parameters:** 1760 kW, PF 93.5, S1 Rating, 175A **Other Devices on the Panel:** Digital Ammeter, CHINT 6L2-A 300-5A **Feeder Protection Relay,** REX 521 RELAYS
4-P-301 Feeder Panel	6,600 Volts	6.6kV CT 300/5/5/5A 0.5/5P20/5P20 30/30/30VA	$/\frac{6.6kV}{\sqrt{3}}/\frac{0.11kV}{\sqrt{3}}/\frac{0.11kV}{3}/\frac{0.11kV}{3}$ 0.5/3P/3P 30/30/100VA	**Motor Parameters:** 1705KW, 340A FLC, PF 0.91, REV 2979/Min **Other Devices on the Panel:** Digital Ammeter, CHINT 6L2-A 300-5A **Feeder Protection Relay,** REX 521 RELAYS **Motor Protection Relay,** MiCOM P225/P123 Relay
5-P-101 Panel	3,300 Volts	400/5A	3.3kv cast resin, 2 cores, 3.3kv/0.110v. 100VA; 50VA	**Motor Parameters:** 1673 KW, 3PH, 3300v, 2970 RPM, Amps 347 **Other Devices on the Panel:** Digital ammeter, Aux.

No.	Operating Voltage Level	Existing Instrument Transformers		Remarks
		Current Transformers, VA, Ratio	Voltage Transformers VA, Ratio	
				supply; 110v ac; RISHABH, 96*96mm A new smart motor management relay is required integrate with EMS
5-P-201 Panel	3,300 Volts	400/5A	3.3kv cast resin, 2 cores, 3.3kv/0.110v; 100VA; 50VA	**Motor Parameters:** 1673 KW, 3PH, 3300v, 2970 RPM, Amps 347 **Other Devices on the Panel:** Digital ammeter, Aux. supply; 110v ac; RISHABH, 96*96mm A new smart motor management relay is required integrate with EMS
5-P-301 Panel	3,300 Volts		3.3kv cast resin, 2 cores, 3.3kv/0.110v; 100VA; 50VA	**Motor Parameters:** 1673 KW, 3PH, 3300v, 2970 RPM, Amps 347 **Other Devices on the Panel:** Analogue meter, 0-400-2400A **Motor Protection Relay,** MiCOM P225/P123 Relay
6-P-101	6,600	6.6 kV CT	$/\frac{6.6kV}{\sqrt{3}}/\frac{0.11kV}{\sqrt{3}}/\frac{0.11kV}{3}/$	**Motor Parameters:**

No.	Operating Voltage Level	Existing Instrument Transformers		Remarks
		Current Transformers, VA, Ratio	Voltage Transformers VA, Ratio	
Panel	Volts	300/5/5/5A 0.5/5P20/5P20 30/30/30VA	$\frac{0.11kV}{3}$ 0.5/3P/3P 30/30/100VA	1760 kW, PF 93.5, S1 Rating, 175A **Other Devices on the Panel:** Digital Ammeter, CHINT 6L2-A 300-5A **Feeder Protection Relay,** REX 521 RELAYS
6-P-201 Panel	6,600 Volts	6.6 kV CT 300/5/5/5A 0.5/5P20/5P20 30/30/30VA	$/\frac{6.6kV}{\sqrt{3}}/\frac{0.11kV}{\sqrt{3}}/\frac{0.11kV}{3}/\frac{0.11kV}{3}$ 0.5/3P/3P 30/30/100VA	**Motor Parameters:** 1760 kW, PF 93.5, S1 Rating, 175A **Other Devices on the Panel:** Digital Ammeter, CHINT 6L2-A 300-5A **Feeder Protection Relay,** REX 521 RELAYS
6-P-301 Panel	6,600 Volts	6.6kV CT 300/5/5/5A 0.5/5P20/5P20 30/30/30VA	$/\frac{6.6kV}{\sqrt{3}}/\frac{0.11kV}{\sqrt{3}}/\frac{0.11kV}{3}/\frac{0.11kV}{3}$ 0.5/3P/3P 30/30/100VA	**Motor Parameters:** 1705KW, 340A FLC, PF 0.91, REV 2979/Min **Other Devices on the Panel:** Digital Ammeter, CHINT 6L2-A 300-5A **Feeder Protection Relay,** REX 521 RELAYS **Motor Protection Relay,**

No.	Operating Voltage Level	Existing Instrument Transformers		Remarks
		Current Transformers, VA, Ratio	Voltage Transformers VA, Ratio	
				MiCOM P225/P123 Relay
7-P-101 Panel	3,300 Volts	400/1 A	3.3kv cast resin, 2 cores, 3.3kv/0.110v; 100VA; 50VA	**Motor Parameters:** HITACHI, 3 Phase Induction Motor, KW 1653 Volts 3300, Amps 347RPM 2970, PF 0.875, Made in Japan **Other Devices on the Panel:** SIEMENS, 0 -400 A(800Mx) A new smart motor management relay is required integrate with EMS
7-P-201 Panel	3,300 Volts	400/1 A	3.3kv cast resin, 2 cores, 3.3kv/0.110v; 100VA; 50VA	**Motor Parameters:** HITACHI, 3 Phase Induction Motor, KW 1653 Volts 3300, Amps 347RPM 2970, PF 0.875, Made in Japan **Other Devices on the Panel:** SIEMENS, 0 -400 A(800Mx) A new smart motor management relay is required integrate with EMS

No.	Operating Voltage Level	Existing Instrument Transformers		Remarks
		Current Transformers, VA, Ratio	Voltage Transformers VA, Ratio	
7-P-301 Panel	3,300 Volts	400/1 A	3.3kv cast resin, 2 cores, 3.3kv/0.110v; 100VA; 50VA	**Motor Parameters:** 1705KW, 340A FLC, PF 0.91, REV 2979/Min **Other Devices on the Panel:** SIEMENS, 0 -400 A(800Mx) **Motor Protection Relay,** MiCOM P225/P123 Relay
8-P-101 Panel	6,600 Volts	6.6 kV CT 300/5/5/5A 0.5/5P20/5P20 30/30/30VA	$/\frac{6.6kV}{\sqrt{3}}/\frac{0.11kV}{\sqrt{3}}/\frac{0.11kV}{3}/\frac{0.11kV}{3}$ 0.5/3P/3P 30/30/100VA	**Motor Parameters:** 1760 kW, PF 93.5, S1 Rating, 175A **Other Devices on the Panel:** Digital Ammeter, CHINT 6L2-A 300-5A **Feeder Protection Relay,** REX 521 RELAYS
8-P-201 Panel	6,600 Volts	6.6 kV CT 300/5/5/5A 0.5/5P20/5P20 30/30/30VA	$/\frac{6.6kV}{\sqrt{3}}/\frac{0.11kV}{\sqrt{3}}/\frac{0.11kV}{3}/\frac{0.11kV}{3}$ 0.5/3P/3P 30/30/100VA	**Motor Parameters:** 1760 kW, PF 93.5, S1 Rating, 175A **Other Devices on the Panel:** Digital Ammeter, CHINT 6L2-A 300-5A **Feeder Protection Relay,**

No.	Operating Voltage Level	Existing Instrument Transformers		Remarks
		Current Transformers, VA, Ratio	Voltage Transformers VA, Ratio	
				REX 521 RELAYS
8-P-301 Panel	6,600 Volts	6.6kV CT 300/5/5/5A 0.5/5P20/5P20 30/30/30VA	$/\frac{6.6kV}{\sqrt{3}}/\frac{0.11kV}{\sqrt{3}}/\frac{0.11kV}{3}/\frac{0.11kV}{3}$ 0.5/3P/3P 30/30/100VA	**Motor Parameters:** 1705KW, 340A FLC, PF 0.91, REV 2979/Min **Other Devices on the Panel:** Digital Ammeter, CHINT 6L2-A 300-5A **Feeder Protection Relay,** REX 521 RELAYS **Motor Protection Relay,** MiCOM P225/P123 Relay

12.3.2.2 **Line 5**

No.	Operating Voltage Level	Existing Instrument Transformers		Remarks
		Current Transformers, VA, Ratio	Voltage Transformers VA, Ratio	
1A-P-401 Feeder Panel	6,600 Volts	400/5/5/5 15VA,0.5FS5 10VA,5P20 10VA,5P20 7.2KV,31.5KA	6600/V3: 110/V3: 110/3	**Motor Parameters:** 1760 kW, PF 93.5, S1 Rating, 175A **Other Devices on the Panel:** Power Meter, EDMI Mk6N GENIUS, Class0.55 (IEC 62053) 3P3N/3P4N In:1/5(6) A, Vn;3x57 -240V, 50Hz,

No.	Operating Voltage Level	Existing Instrument Transformers		Remarks
		Current Transformers, VA, Ratio	Voltage Transformers VA, Ratio	
				Meter Constant: 5000 Inp KWH, 5000 Invar Volt Meter, REM 615 Voltage Inputs, Un=100-120V Digital Ammeter REM 615, Current Inputs In=1/5A **Motor Protection Relay,** REM 615 Voltage Inputs Un=100-120V, Current Inputs In=1/5A, Supports Modbus, DNP3 and IEC 60870-5-103 communication protocols
1A-P-401 VFD Panel	6,600 Volts			Includes a Modbus RTU Interface Board
1A-P-402 Feeder Panel	6,600 Volts	400/5/5/5 15VA,0.5FS5 10VA,5P20 10VA,5P20 7.2KV,31.5KA	6600/V3: 110/V3: 110/3	**Motor Parameters:** 1760 kW, PF 93.5, S1 Rating, 175A **Other Devices on the Panel:** Power Meter, EDMI Mk6N GENIUS, Class0.55 (IEC 62053) 3P3N/3P4N In:1/5(6) A, Vn;3x57 -240V, 50Hz, Meter Constant: 5000 Inp KWH, 5000 Invar Volt Meter, REM 615 Voltage Inputs, Un=100-120V Digital Ammeter REM 615,

No.	Operating Voltage Level	Existing Instrument Transformers		Remarks
		Current Transformers, VA, Ratio	Voltage Transformers VA, Ratio	
				Current Inputs In=1/5A **Motor Protection Relay,** REM 615 Voltage Inputs Un=100-120V, Current Inputs In=1/5A, Supports Modbus, DNP3 and IEC 60870-5-103 communication protocols
1A-P-402 VFD Panel	6,600 Volts			Includes a Modbus RTU Interface Board
3A-P-401 Feeder Panel	6,600 Volts	400/5/5/5 15VA,0.5FS5 10VA,5P20 10VA,5P20 7.2KV,31.5KA	6600/V3: 110/V3: 110/3	**Motor Parameters:** 1760 kW, PF 93.5, S1 Rating, 175A **Other Devices on the Panel:** Power Meter, EDMI Mk6N GENIUS, Class0.55 (IEC 62053) 3P3N/3P4N In:1/5(6) A, Vn;3x57 -240V, 50Hz, Meter Constant: 5000 Inp KWH, 5000 Invar Volt Meter, REM 615 Voltage Inputs, Un=100-120V Digital Ammeter REM 615, Current Inputs In=1/5A **Motor Protection Relay,** REM 615 Voltage Inputs Un=100-120V, Current Inputs In=1/5A, Supports Modbus, DNP3 and IEC

No.	Operating Voltage Level	Existing Instrument Transformers		Remarks
		Current Transformers, VA, Ratio	Voltage Transformers VA, Ratio	
				60870-5-103 communication protocols
3A-P-401 VFD Panel	6,600 Volts			Includes a Modbus RTU Interface Board
3A-P-402 Feeder Panel	6,600 Volts	400/5/5/5 15VA,0.5FS5 10VA,5P20 10VA,5P20 7.2KV,31.5KA	6600/V3: 110/V3: 110/3	**Motor Parameters:** 1760 kW, PF 93.5, S1 Rating, 175A **Other Devices on the Panel:** Power Meter, EDMI Mk6N GENIUS, Class0.55 (IEC 62053) 3P3N/3P4N In:1/5(6) A, Vn;3x57 -240V, 50Hz, Meter Constant: 5000 Inp KWH, 5000 Invar Volt Meter, REM 615 Voltage Inputs, Un=100-120V Digital Ammeter REM 615, Current Inputs In=1/5A **Motor Protection Relay,** REM 615 Voltage Inputs Un=100-120V, Current Inputs In=1/5A, Supports Modbus, DNP3 and IEC 60870-5-103 communication protocols
3A-P-402 VFD Panel	6,600 Volts			Includes a Modbus RTU Interface Board
5A-P-401	6,600	400/5/5/5	6600/V3:	**Motor Parameters:**

No.	Operating Voltage Level	Existing Instrument Transformers		Remarks
		Current Transformers, VA, Ratio	Voltage Transformers VA, Ratio	
Feeder Panel	Volts	15VA,0.5FS5 10VA,5P20 10VA,5P20 7.2KV,31.5KA	110/V3: 110/3	1760 kW, PF 93.5, S1 Rating, 175A **Other Devices on the Panel:** Power Meter, EDMI Mk6N GENIUS, Class0.55 (IEC 62053) 3P3N/3P4N In:1/5(6) A, Vn;3x57 -240V, 50Hz, Meter Constant: 5000 Inp KWH, 5000 Invar Volt Meter, REM 615 Voltage Inputs, Un=100-120V Digital Ammeter REM 615, Current Inputs In=1/5A **Motor Protection Relay,** REM 615 Voltage Inputs Un=100-120V, Current Inputs In=1/5A, Supports Modbus, DNP3 and IEC 60870-5-103 communication protocols
5A-P-401 VFD Panel	6,600 Volts			Includes a Modbus RTU Interface Board
5A-P-402 Feeder Panel	6,600 Volts	400/5/5/5 15VA,0.5FS5 10VA,5P20 10VA,5P20 7.2KV,31.5KA	6600/V3: 110/V3: 110/3	**Motor Parameters:** 1760 kW, PF 93.5, S1 Rating, 175A **Other Devices on the Panel:** Power Meter, EDMI Mk6N GENIUS, Class0.55 (IEC

No.	Operating Voltage Level	Existing Instrument Transformers		Remarks
		Current Transformers, VA, Ratio	Voltage Transformers VA, Ratio	
				62053) 3P3N/3P4N In:1/5(6) A, Vn;3x57 -240V, 50Hz, Meter Constant: 5000 Inp KWH, 5000 Invar Volt Meter, REM 615 Voltage Inputs, Un=100-120V Digital Ammeter REM 615, Current Inputs In=1/5A **Motor Protection Relay,** REM 615 Voltage Inputs Un=100-120V, Current Inputs In=1/5A, Supports Modbus, DNP3 and IEC 60870-5-103 communication protocols
5A-P-402 VFD Panel	6,600 Volts			Includes a Modbus RTU Interface Board
7A-P-401 Feeder Panel	6,600 Volts	400/5/5/5 15VA,0.5FS5 10VA,5P20 10VA,5P20 7.2KV,31.5KA	6600/V3: 110/V3: 110/3	**Motor Parameters:** 1760 kW, PF 93.5, S1 Rating, 175A **Other Devices on the Panel:** Power Meter, EDMI Mk6N GENIUS, Class0.55 (IEC 62053) 3P3N/3P4N In:1/5(6) A, Vn;3x57 -240V, 50Hz, Meter Constant: 5000 Inp KWH, 5000 Invar Volt Meter, REM 615 Voltage Inputs, Un=100-

No.	Operating Voltage Level	Existing Instrument Transformers		Remarks
		Current Transformers, VA, Ratio	Voltage Transformers VA, Ratio	
				120V Digital Ammeter REM 615, Current Inputs In=1/5A **Motor Protection Relay,** REM 615 Voltage Inputs Un=100-120V, Current Inputs In=1/5A, Supports Modbus, DNP3 and IEC 60870-5-103 communication protocols
7A-P-401 VFD Panel	6,600 Volts			Includes a Modbus RTU Interface Board
7A-P-402 Feeder Panel	6,600 Volts	400/5/5/5 15VA,0.5FS5 10VA,5P20 10VA,5P20 7.2KV,31.5KA	6600/V3: 110/V3: 110/3	**Motor Parameters:** 1760 kW, PF 93.5, S1 Rating, 175A **Other Devices on the Panel:** Power Meter, EDMI Mk6N GENIUS, Class0.55 (IEC 62053) 3P3N/3P4N In:1/5(6) A, Vn;3x57 -240V, 50Hz, Meter Constant: 5000 Inp KWH, 5000 Invar Volt Meter, REM 615 Voltage Inputs, Un=100-120V Digital Ammeter REM 615, Current Inputs In=1/5A **Motor Protection Relay,** REM 615 Voltage Inputs Un=100-120V, Current

No.	Operating Voltage Level	Existing Instrument Transformers		Remarks
		Current Transformers, VA, Ratio	Voltage Transformers VA, Ratio	
				Inputs In=1/5A, Supports Modbus, DNP3 and IEC 60870-5-103 communication protocols
7A-P-402 VFD Panel	6,600 Volts			Includes a Modbus RTU Interface Board

12.3.2.3 **Line 2**

No.	Operating Voltage Level	Existing Instrument Transformers		Remarks
		Current Transformers, VA, Ratio	Voltage Transformers VA, Ratio	
21-P-01 Panel	3,300 Volts	CT 4,5,6 3.3kV 100/5A 10VA CL 0.5 3.3kV 100/5A 10VA 5P10	PT.1,2,3 $/\frac{3300}{\sqrt{3}}/\frac{110}{\sqrt{3}}/\frac{110}{3}$ /V 50VA Cl 0.5 50VA Cl 3P	**Motor Parameters:** 1119kW, 315A, 0.9pf **Other Devices on the Panel:** Digital Power Meter PM5110 **Motor Protection Relay,** SEPAM T40 M41 which Supports Modbus TCPIP, Modbus RTU, DNP3, IEC 60870-5-103 and IEC 61850 communication protocols. And

No.	Operating Voltage Level	Existing Instrument Transformers		Remarks
		Current Transformers, VA, Ratio	Voltage Transformers VA, Ratio	
				SMC-Flex controller with slot for standard DPI communications cards DeviceNet, ControlNet, Remote I/O, Modbus, and ProfibusDP
21-P-02 Panel	3,300 Volts	CT 4,5,6 3.3kV 100/5A 10VA CL 0.5 3.3kV 100/5A 10VA 5P10	PT.1,2,3 $/\frac{3300}{\sqrt{3}}/\frac{110}{\sqrt{3}}/\frac{110}{3}$ /V 50VA Cl 0.5 50VA Cl 3P	**Motor Parameters:** 1119kW, 315A, 0.9pf **Other Devices on the Panel:** Digital Power Meter PM5110 **Motor Protection Relay,** SEPAM T40 M41 which Supports Modbus TCPIP, Modbus RTU, DNP3, IEC 60870-5-103 and IEC 61850 communication protocols. And SMC-Flex controller with slot for standard DPI communications cards DeviceNet, ControlNet, Remote I/O, ModBus□, and Profibus□□DP
22-P-01	3,300	3.3kV 250/5	$/\frac{3300}{\sqrt{3}}/\frac{110}{\sqrt{3}}/\frac{110}{3}$ /V	**Motor Parameters:**

No.	Operating Voltage Level	Existing Instrument Transformers		Remarks
		Current Transformers, VA, Ratio	Voltage Transformers VA, Ratio	
Panel	Volts	2000/1	200VA	3.3Kv, 1007Kw, 202A, 0.91pf **Other Devices on the Panel:** **Motor Protection Relay,** Multilin 469 which Supports Multiple Protocols – Modbus RTU, Modbus TCP/IP, DeviceNet and has Multiple Ports – 10baseT Ethernet, RS485, RS232, RS422, DeviceNet
22-P-02 Panel	3,300 Volts	3.3kV 250/5 2000/1	$/\frac{3300}{\sqrt{3}}/\frac{110}{\sqrt{3}}/\frac{110}{3}$ /V 200VA	**Motor Parameters:** 3.3Kv, 1007Kw, 202A, 0.91pf **Other Devices on the Panel:** **Motor Protection Relay,** Multilin 469 which Supports Multiple Protocols – Modbus RTU, Modbus TCP/IP, DeviceNet and has Multiple Ports – 10baseT Ethernet, RS485, RS232, RS422, DeviceNet
23-P-01 Panel	3,300 Volts	3.3kV CT 250/5 5VA	2500KVA-RAT-10	**Motor Parameters:** ABB-3ph 1125KW

No.	Operating Voltage Level	Existing Instrument Transformers		Remarks
		Current Transformers, VA, Ratio	Voltage Transformers VA, Ratio	
			250KVA RAT-8	3300V 50HZ 2981rpm 233A PF 0.87 µ=none **Other Devices on the Panel:** Ammeter, HOBUT 0-1500A Power Meter, 1. EDAT-BS06 Microstar 2. BLUE STAR 8000/KWH 8000/KVAR **Motor Protection Relay,** MPR 3000 (P&B) with RS485 Port for Modbus RTU or P&B Protocol
23-P-02 Panel	3,300 Volts	3.3kV CT 250/5 5VA	2500KVA-RAT-10 250KVA RAT-8	**Motor Parameters:** ABB-3ph 1125KW 3300V 50HZ 2981rpm 233A PF 0.87 µ=none **Other Devices on the Panel:** Ammeter, HOBUT 0-1500A Power Meter, 1. EDAT-BS06 Microstar 2. BLUE STAR 8000/KWH 8000/KVAR **Motor Protection**

No.	Operating Voltage Level	Existing Instrument Transformers		Remarks
		Current Transformers, VA, Ratio	Voltage Transformers VA, Ratio	
				Relay, MPR 3000 (P&B) with RS485 Port for Modbus RTU or P&B Protocol
24-P-01 Panel	3,300 Volts	3.3kV 250/5 2000/1	$/\frac{3300}{\sqrt{3}}/\frac{110}{\sqrt{3}}/\frac{110}{3}$ /V 200VA	**Motor Parameters:** 1119kW, 315A, 0.9pf **Other Devices on the Panel:** **Motor Protection Relay,** Multilin 469 which Supports Multiple Protocols – Modbus RTU, Modbus TCP/IP, DeviceNet and has Multiple Ports – 10baseT Ethernet, RS485, RS232, RS422, DeviceNet
24-P-02 Panel	3,300 Volts	3.3kV 250/5 2000/1	$/\frac{3300}{\sqrt{3}}/\frac{110}{\sqrt{3}}/\frac{110}{3}$ /V 200VA	**Motor Parameters:** 1119kW, 315A, 0.9pf **Other Devices on the Panel:** **Motor Protection Relay,** Multilin 469 which Supports Multiple Protocols – Modbus RTU, Modbus TCP/IP, DeviceNet and has Multiple Ports – 10baseT Ethernet,

No.	Operating Voltage Level	Existing Instrument Transformers		Remarks
		Current Transformers, VA, Ratio	Voltage Transformers VA, Ratio	
				RS485, RS232, RS422, DeviceNet

12.3.2.4 **Line 4**

No.	Operating Voltage Level	Existing Instrument Transformers		Remarks
		Current Transformers, VA, Ratio	Voltage Transformers VA, Ratio	
21B-P-401A Panel	3,300 Volts	3/ALCE AB12 400/1-1A CL 0.5 Fs10 15VA 31.5A 3s 3/ALCE AB12 400/1-1A 5P20 10VA 31.5A 3s	PT.1,2,3 $/\frac{3300}{\sqrt{3}}/\frac{110}{\sqrt{3}}/\frac{110}{3}$ /V 50VA Cl 0.5 50VA Cl 3P	**Motor Parameters:** 1500KW **Other Devices on the Panel:** Digital Power Meter PM5110 **Motor Protection Relay,** SEPAM T40 M41 which Supports Modbus TCPIP, Modbus RTU, DNP3, IEC 60870-5-103 and IEC 61850 communication protocols And Altivar 1200 Motor Controller
21B-P-401B Panel	3,300 Volts	3/ALCE AB12 400/1-1A CL 0.5 Fs10 15VA	PT.1,2,3 $/\frac{3300}{\sqrt{3}}/\frac{110}{\sqrt{3}}/\frac{110}{3}$ /V	**Motor Parameters:** 1500KW

No.	Operating Voltage Level	Existing Instrument Transformers		Remarks
		Current Transformers, VA, Ratio	**Voltage Transformers VA, Ratio**	
		31.5A 3s 3/ALCE AB12 400/1-1A 5P20 10VA 31.5A 3s	50VA Cl 0.5 50VA Cl 3P	**Other Devices on the Panel:** Digital Power Meter PM5110 **Motor Protection Relay,** SEPAM T40 M41 which Supports Modbus TCPIP, Modbus RTU, DNP3, IEC 60870-5-103 and IEC 61850 communication protocols And Altivar 1200 Motor Controller
21B-P-402A Panel	3,300 Volts	3/ALCE AB12 100/1-1A CL 0.5 Fs10 15VA 31.5A 3s 3/ALCE AB12 100/1-1A 5P20 10VA 31.5A 3s	$/\frac{6000V}{\sqrt{3}}/\frac{110V}{\sqrt{3}}/$ - 30VA CL0.5 $\frac{110V}{\sqrt{3}}/$ - 30VA 3P	**Motor Parameters:** 160KW **Other Devices on the Panel:** Digital Power Meter PM5110 **Motor Protection Relay,** SEPAM T40 which Supports Modbus TCPIP, Modbus RTU, DNP3, IEC 60870-5-103 and IEC 61850 communication protocols

No.	Operating Voltage Level	Existing Instrument Transformers		Remarks
		Current Transformers, VA, Ratio	Voltage Transformers VA, Ratio	
				And Altivar 1200 Motor Controller
21B-P-402B Panel	3,300 Volts	3/ALCE AB12 100/1-1A CL 0.5 Fs10 15VA 31.5A 3s 3/ALCE AB12 100/1-1A 5P20 10VA 31.5A 3s	$/\frac{6000V}{\sqrt{3}}/\frac{110V}{\sqrt{3}}/$ - 30VA CL0.5 $\frac{110V}{\sqrt{3}}$/ - 30VA 3P	**Motor Parameters:** 160KW **Other Devices on the Panel:** Digital Power Meter PM5110 **Motor Protection Relay,** SEPAM T40 which Supports Modbus TCPIP, Modbus RTU, DNP3, IEC 60870-5-103 and IEC 61850 communication protocols And Altivar 1200 Motor Controller
21B-P-402C Panel	3,300 Volts	3/ALCE AB12 100/1-1A CL 0.5 Fs10 15VA 31.5A 3s 3/ALCE AB12 100/1-1A 5P20 10VA 31.5A 3s	$/\frac{6000V}{\sqrt{3}}/\frac{110V}{\sqrt{3}}/$ - 30VA CL0.5 $\frac{110V}{\sqrt{3}}$/ - 30VA 3P	**Motor Parameters:** 160KW **Other Devices on the Panel:** Digital Power Meter PM5110 **Motor Protection Relay,** SEPAM T40

No.	Operating Voltage Level	Existing Instrument Transformers		Remarks
		Current Transformers, VA, Ratio	Voltage Transformers VA, Ratio	
				which Supports Modbus TCPIP, Modbus RTU, DNP3, IEC 60870-5-103 and IEC 61850 communication protocols And Altivar 1200 Motor Controller
24B-P-401A Panel	3,300 Volts	400/1, 15VA 10P20 50/1, 15VA, 0.5	3300/110, 200VA	**Motor Parameters:** 1119kW, 315A, 0.9pf **Other Devices on the Panel:** **Motor Protection Relay,** SPAM 150C which supports Fiber Optic Serial Communication over SPA Bus
24B-P-401B Panel	3,300 Volts	400/1, 15VA 10P20 50/1, 15VA, 0.5	3300/110, 200VA	**Motor Parameters:** 1119kW, 315A, 0.9pf **Other Devices on the Panel:** **Motor Protection Relay,** SPAM 150C which supports Fiber Optic Serial Communication over SPA Bus

13 SOFTWARE CUSTOMIZATION/ DEVELOPMENT

✓

The Supplier MUST perform Software Customization / Development using a formal software development methodology with the following characteristics and/ or with the following technologies and/ or tools. **NOT APPLICABLE**System Integration (to other existing systems)

The Supplier MUST perform the following Integration Services:

i. Integration to KPC's SAP system and ensure data exchange between SCADA and SAP

ii. Integration to External backup appliance integration.

iii. Migration of existing users to the new SCADA application

iv. Migration of existing historical data into SCADA system application

v. Integration of Acculoads in depots into SCADA module

vi. Integration of ATG systems at all KPC depots and KPRL into SCADA ATG Module

vii. Integration of Fire Alarm Systems into SCADA Fire Alarming module and configure mimics accordingly. Where Fire Alarms are not integration ready, Supplier to provide template in SCADA module for future KPC installations.

viii. Integration of UPS Systems into SCADA UPS module and configure mimics accordingly. Where UPSs are not integration ready, Supplier to provide template in SCADA module for future KPC installations.

ix. Integration of Cathodic Protection Systems into SCADA CP module and configure mimics accordingly. Where CP stations are not integration ready, Supplier to provide template in SCADA module for future KPC installations

x. Integrating operator modules

xi. Integration of Energy Management devices into SCADA Energy Management module and configure reports accordingly. Where devices are not integration ready, Supplier to provide template in SCADA module for future KPC installations

xii. Integrating other systems in the scope.

1 Training and Training Materials

The Supplier MUST provide the following Training Services and Materials.

15.1 SCADA System Training

15.1.1 The Contractor shall provide SCADA engineering training to **3No**. KPC technical staff at the manufacturing premises.

15.1.2 The Contractor shall provide Energy Management Module training to **3No**. KPC technical staff at the manufacturing premises.

15.1.3 The Contractor shall provide Product Scheduling and Planning training to **3No**. KPC technical staff at the manufacturing premises.

15.1.4 The Contractor shall provide operations training to **12No**. KPC technical staff at the manufacturing premises.

15.1.5 The Contractor shall provide operations training to **40No**. KPC technical staff at KPC premises after completing the installation and commissioning of the system. This training shall be at the supplier's expense, and shall include the cost of training, training materials and meals. The operations syllabus to cover all modules supplied under this scope; including but not limited to SCADA and LDS functionality, product scheduling, energy management, product accounting, reports generation, systems maintenance etc.

15.1.6 A training schedule detailing the training content shall be submitted two weeks prior to beginning of the training.

15.1.7 For all trainings conducted at the manufacturer's premises, the Contractor shall provide all reasonable support and information to assist the Employer with the arrangements for travel & accommodations and shall provide local travel where appropriate.

15.1.8 KPC shall therefore be responsible for all the logistical arrangements for the following: -

- ✓ Air travel to and from the country of training,
- ✓ Accommodation during the period of training
- ✓ Meals,
- ✓ Procurement of visa

- ✓ Local travel where applicable

15.1.9 The KPC shall make payments directly for the services listed above, therefore the component of training at the manufacturer's premises shall be adjusted accordingly at the time of payment certification. These payments shall be independent of the project milestones.

15.1.10 Out-of-pocket allowance for the employer's representative attending the training shall be the responsibility of the employer in line with the employer's travel policy.

15.2 System Development and skills transfer

15.2.1 The Contractor shall have **3No** for SCADA KPC staff attached to the project from inception to completion. This staff shall be involved in the development of the system together with the manufacturer at all stages of the project cycle.

15.2.2 The attachees shall be based at development site(s) for the duration of the Contract, except for the period of application software development. Where it may become necessary for the attachees to travel overseas other than as indicated above, the Contractor shall inform the Employer in good time to enable timely the arrangements for their travel.

15.2.3 The Contractor shall provide for the attachment of this staff. Where such attachment takes the attachees to the manufacturer's premises, the logistics for their travel shall be as outlined in clause 15.1 above apply.

2 Data Conversion and Migration

The Supplier MUST provide services and tools to migrate the existing data and users into the SCADA Upgraded system.

3 Documentation Requirements

The Supplier MUST prepare and provide the following Documentation.

17.1 Drawings and Documentations

17.1.1 The Contractor shall prepare installation/construction documentation & drawings showing the positions and details of all works carried out by him. These records shall be reviewed as the works progress.

17.1.2 All documentation and communications shall be in English language.

17.1.3 For the commencement of engineering works, the Employer shall provide to the Contractor with the following documentation for each station that will be integrated into the SCADA & LDS solution:

a) Instrument tagging (Index)
b) Range list for each instrument.
c) Alarm set-points (Advisory/Warning/Critical) for each instrument where applicable.
d) Modbus map for all instruments and equipment.
e) Process and Instrument Diagrams (P&IDs).
f) Typical Graphics (i.e., Existing SCADA screen shots).
g) Operations and Maintenance manuals of Instruments/equipment to be integrated.
h) Operations Philosophy (Operations and Control Manuals).
i) Communications Network diagram (i.e., Architecture, Network topology).
j) Single line diagram and schematics of pump station switchgear.
k) Pipeline topology, elevation profile and hydraulic study.
l) Layout drawings for control and equipment rooms in Nairobi and at pump stations.
m) General arrangement drawings of all control and electrical panels.
n) 3rd Party interfaces to other equipment not part of the works.

17.1.4 The Contractor shall submit to the Employer for review and approval the following documents as a minimum for all the works under the Contract:

a) System Configuration Blueprints.
b) Operations User Manuals.

c) Maintenance/Service Manual containing the maintenance strategies & Procedures.

d) Inventory containing a detailed list of equipment/software supplied and their locations.

e) All Software supplied together with the Licenses where applicable.

f) List of spares for all system hardware supplied.

g) Updated copies of any of the documents in clause 17.3 that shall have been modified during the implementation of the Contract

17.2 Records

17.2.1 The Contractor shall prepare and submit within 3 months after SAT 'as built' documents/drawings showing the positions and details of all work constructed by him. These records shall take the form of an updated copy of the Contractor's installation/construction drawings.

17.2.2 Three (3) sets of each 'as built' document and drawing shall be handed to the KPC Project Engineer for review and approval.

17.2.3 Upon approval of the documents/drawings by the KPC Project Engineer, the Contractor shall submit 6(six) further copies of each to the Engineer together with a single soft copy.

17.2.4 Operation Philosophy, System operations & Maintenance manuals shall be submitted as indicated in the technical requirements.

17.2.5 The soft copy of "As Built" drawings shall be in native format in the current version at the time of Contract signing of the appropriate software packages (including but not limited to AutoCAD and Microsoft Visio). Drawings submitted in PDF format only shall be rejected and contractor requested to resubmit in the accepted format.

17.2.6 These drawings, together with the disc(s) shall become the property of the Employer.

17.2.7 Record drawings shall include, but not necessarily be limited to:

a) General arrangement drawings showing all mechanical, electrical, and electronic equipment including cabling tray etc.

b) Detailed wiring, cable route and electrical layout schematic diagrams of the main circuits.

c) Diagrams of connections between all items of equipment, batteries, meters, instruments.

d) All civil works including building general arrangement & structures.

17.3 Operating and Maintenance Manual

17.3.1 The Contractor shall prepare and submit to the Engineer for approval 3 hard copies of the detailed operations philosophy, operating and maintenance manuals for the works.

17.3.2 Upon approval, the Contractor shall submit a further ten (10) hard cover bound copies and a soft copy of the operations philosophy, operating and maintenance manuals which shall become the property of KPC.

17.4 Project Progress Monitoring

17.4.1 The contract program activities document shall include, as defined tasks, the production of several written documents highlighting the progress made for each phase of the project.

17.4.2 A typical list of these documents, hereafter called deliverables, is included below.

17.4.3 The Contractor shall be responsible for producing a final list of deliverables appropriate for his equipment and programming methods.

17.4.4 List of drawings/documents to be furnished by the SCADA and Associated Systems contractor, and their suppliers (as applicable) after award of contract shall be as follows:

No.	Description	Installation proposal	As Built
1.	Drawing and Document Schedule	Required	Required
2.	SCADA & Application Functional Design Specification	Required	Required
3.	SCADA MMI document	Required	Required
4.	Control room layout	Required	Required
5.	Engineering drawings & documents	Required	Required
6.	Construction drawings & documents	Required	Required
7.	SCADA & Associated Systems FAT plans & procedures	Required	
8.	Training details including content, duration, and venues	Required	
9.	SCADA system engineering, user & installation manuals, operation, maintenance & troubleshooting manuals for all hardware, software & equipment including System configuration/programming manuals		Required
10.	Application user and maintenance manual		Required
11.	Manual system engineering manual		Required
12.	System configuration editor manual		Required
13.	Proposed network architecture	Required	Required
14.	System configuration diagram	Required	Required
15.	I/O signals list for all stations	Required	Required
16.	Instrumentation/electrical signal interface details	Required	Required
17.	Material Quantities	Required	Required

17.5 Requirements of the Supplier's Technical Team

The Supplier MUST maintain a technical team of the following roles and skill levels during the Installation, Testing and Commissioning Activities under the Contract:

1) Project Team Leader: *1No SCADA System Professional with*

minimum 10years experience in project management.

2) SCADA Programming Expert: *3No SCADA programming experts with 10 years of experience in system development and commission.*

3) Network and Communications Expert: *1No Netwrok Secutiy Collaboration Expert*

4) Training Expert: *2No professional Trainers on SCADA system.*

5) PLC Experts: *3No professionals with experience in Allen Bradley Controllogix, Schneider Quantum PLC and Delta V systems (one professional each field).*

6) SAP Integration Expert: *1No professional in SAP to SCADA integration experience.*

17.6 Technology Specifications– Supply& Install Items

General Technical Requirements

1) **Language Support**: All information technologies must be in English.

2) **Electrical Power**: KPC shall provide 240VAC.

3) **Environmental**: Unless otherwise specified, all equipment must operate in environments as per KPC site conditions.

4) **Safety:**

4.1 Unless otherwise specified, all equipment must operate at noise levels no greater than …. decibels - *as low as possible*

4.2 All electronic equipment that emits electromagnetic energy must be certified as meeting …. or equivalent, emission standards.

4 Testing and Quality Assurance Requirements

18.1 Systems Factory Acceptance Tests (FAT)

18.1.1 The contractor shall provide for FAT. This shall include logistical arrangements/assistance for at least **18No.** KPC staff to travel to the manufacturer's premises for inspection and acceptance of various system

modules including SCADA, Energy management, product scheduling, system security etc., as outlined.

18.1.2 For FAT at the manufacturer's premises, the Contractor shall be responsible for the actual testing execution and all associated materials for its success, provide all reasonable support and information to assist the Employer with the arrangements for travel & accommodations for the Employers representatives, and shall provide local travel where appropriate.

18.1.3 The Employer shall therefore be responsible for and logistical arrangements for the following:

- ✓ Air travel to and from the country of training,
- ✓ Accommodation during the period of training
- ✓ Meals,
- ✓ Procurement of visa
- ✓ Local travel where applicable.

18.1.4 The employer KPC shall make payments directly for the services listed in clause 8.3 above, therefore the component of FAT at the manufacturer's premises shall be adjusted accordingly at the time of certification of payment. These payments shall be independent of the project milestones.

18.1.5 Out-of-pocket allowance for the employer's representative attending the training shall be the responsibility of the employer in line with the employer's travel policy.

18.1.6 The FAT shall be as proposed in the contractor's proposed program of works as a minimum. The detailed procedure and schedule of the inspections & tests shall be submitted four (4) weeks prior to inspection commencement date.

18.1.7 The complete range of quality inspection and system tests as specified shall be carried out at the manufacturer's premises and be attended by at

least **18No.** KPC staff. These are to include, but not limited to, the following:

a) Physical check of general appearance, finish, mechanical assembly undamaged condition and general worthiness.

b) Inspection of physical equipment and cabinets.

c) Testing of various software and computer-based systems.

d) Configuration and simulation tests to mimic real life situations.

18.1.8 The test methodology shall be as given by the manufacturer of the system under test and shall be conducted as outlined in specifications.

18.2 Pre-commissioning Tests

In addition to the Supplier's standard check-out and set-up tests, the Supplier (with the assistance of the Procuring Entity) must perform the following tests on the System and its Sub systems before Installation will be deemed to have occurred and the Procuring Entity will issue the Installation Certificate (s) (pursuant to GCC Clause 26 and related SCC clauses).

18.2.1 Inspection and Testing

18.2.1.1 *General*

All equipment and components of the equipment shall be subject to inspection and testing both during and upon completion of manufacture and on-site during SAT and commissioning. The Contractor shall include with his supply full details of all type tests carried out on boards and modules, and tests normally carried out in their works including to what standards these are carried out. These tests shall preferably be in accordance with International Standards.

18.2.1.2 *Inspection during Manufacture*

KPC reserves the right to inspect any part or the whole of the Works during or on completion of manufacture. Every facility shall be provided by the Contractor to enable the Employer or his nominated representative to carry out the necessary inspection of the plant.

18.2.1.3 No item shall be dispatched from the Contractor's works without a release being issued by the Employer.

18.2.1.4 The passing of such inspection or the waiving of inspection shall not prejudice the right of the Employer to reject the plant if it is subsequently found that it does not comply with the Specification.

18.2.1.5 System Factory Acceptance Testing (FAT)

The Contractor shall prepare a detailed system test schedule and submit to KPC for approval 30 days prior to the scheduled test.

18.2.1.6 After the successful completion of a specific tests, a 72-hour continuous run of the section of works under test shall be performed without loss of any function, without any hardware or software/firmware failure, during which time actual operation is simulated and all functions are tested to determine possible weaknesses. The time may also be used for unstructured testing by the Employer.

18.2.1.7 Faulty and/or incorrect operation of major functions (major discrepancies) may, at the discretion of the Employer, because for the dispersion or restarting of the entire test, pending the correction of the problem. Minor discrepancies noted shall be corrected and retested. The Employer reserves the right to request additional retesting of modules that it suspects may be impacted by corrections. The re-run of the 36-hour continuous test shall be mandatory after any major or minor corrections to the system.

18.2.1.8 The Contractor shall demonstrate at the Manufacturer's premises, to the satisfaction of the Employer, that the complete fully assembled system performs in the manner specified herein.

18.2.1.9 The Contractor shall prepare a set of test procedures which will be used for testing the system.

18.2.1.10 Each inspection or test procedure/record shall be laid out clearly and include the following details:

- The inspection or test name.

- A Purpose section explaining the reason for the inspection or test.
- A Procedure section explaining step-by-step the procedures to be followed and the responses/values to be expected at each step. Where a range of values can be obtained the range is to be identified.
- A space for recording the name of the test.
- A space indicating inspection or test, pass, or failure.
- A space for the signature of the Employer's Representative.
- A space for any comments.

18.2.1.11 The Contractor shall provide input simulation and output monitoring equipment, together with any other necessary test equipment to permit all plant input/output signals to be simulated/monitored simultaneous and the system functional requirements to be readily verified (with no modification to the software).

18.2.1.12 The Contractor shall provide office facilities for the Employer during the FAT.

18.2.1.13 Upon completion of the tests and before dispatch of the equipment from the works, the Contractor shall forward certified test sheets to the Employer for approval.

18.2.1.14 The Employer may be present at all tests. The Contractor shall give 5 days' notice, in writing, before such tests are carried out.

18.2.1.15 For all testing in the manufacturer's premises (including configuration testing) the supplier shall provide:

- All power supplies for the duration of testing
- All test equipment and interconnections
- All labour required for testing.

18.3 Operational Acceptance Tests

18.3.1 Pursuant to GCC Clause27 and related SCC clauses, the Procuring Entity (with the assistance of the Supplier) willperformthefollowingtestsontheSystemanditsSubsystemsfollowing Installati on to determine whether the System and the Sub systems meet all the requirements mandated for Operational Acceptance.

18.3.2 *Each Module:* features and functionality shall be tested and confirmed conforming to specifications and user requirements.

18.3.3 *Integration*: Testing and functionality on services and systems integration shall be carried out.

18.4 Service Specifications–Recurrent Cost Items

i) Warranty Defect Repair

The Supplier MUST provide the following services under the Contract or, as appropriate under separate contracts (as specified in the tendering documents).

ii) Warranty Defect Repair Service: As per contract terms

iii) Technical Support: as per contract terms

The Supplier MUST provide the following services under the Contract or, as appropriate under separate contracts (as specified in the tendering documents).

1) User support / hot line: *supplier to avail local resource personnel for user support when required within short timelines.*

2) Technical Assistance: *Any defect as may be reported be resolved within 2hours of reporting*

3) Post-Warranty Maintenance Services: *this shall be as per Service Level Agreement*

5 Implementation Schedule

Notes on preparing the Implementation Schedule the Implementation Schedule summarize when and where Installation, and Operational Acceptance should take place for all Sub systems and/ or major components of the System, and for the overall System itself – as well as any other major Contract milestones.

a) Implementation Schedule Table

Line Item No.	Subsystem / Item	Configuration Table No.	Site / Site Code	Delivery (Tenderer to specify in the Preliminary Project Plan)	Installation (weeks from Effective Date)	Acceptance (weeks from Effective Date)	Liquidated Damages Milestone
0	Project Plan	- -	- -		- -	W_	no
1							
:							
x							
y							

Note: The System Inventory Table(s) for the specific items and components that constitute the Subsystems or item. Refer to the Site Table(s) below for details regarding the site and the site code.

- - indicates not applicable. “Indicates repetition of table entry above.

b) SITE TABLE(S)

Site Code	Site	City / Town / Region	Primary Street Address	Drawing Reference No. (if any)
PS14	Kipevu Oil Storage Facility			
PS1	Chnagamwe			
PS2				
PS3				
PS4				

c) TABLE OF HOLIDAYS AND OTHER NON – WORKING DAYS

[Specify: ***the days for each month for each year that are non-working days, due to Holidays or other business reasons (other than weekends).****]*

Month	**20xy**	**20xy+1**	**20xy+2**	**....**			**...**	**20zz**
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								

PART 3 – CONDITIONS OF CONTRACT AND CONTRACT FORMS

SECTION VI – GENERAL CONDITIONS OF CONTRACT

A. CONTRACT AND INTERPRETATION

1. Definitions

1.1 In this Contract, the following terms shall be interpreted as indicated below.

a) Contract Elements

i) "Contract" means the Contract Agreement entered into between the Procuring Entity and the Supplier, together with the Contract Documents referred to therein. The Contract Agreement and the Contract Documents shall constitute the Contract, and the term "the Contract" shall in all such documents be construed accordingly.

ii) "Contract Documents" means the documents specified in Article1.1(Contract Documents) of the Contract Agreement (including any amendments to these Documents).

iii) "Contract Agreement" means the agreement entered into between the Procuring Entity and the Supplier using the form of Contract Agreement contained in the Sample Contractual Forms Section of the tender documents and any modifications to this form agreed to by the Procuring Entity and the Supplier. The date of the Contract Agreement shall be recorded in the signed form.

iv) "GCC" means the General Conditions of Contract.

v) "SCC" means the Special Conditions of Contract.

vi) "Technical Requirements" means the Technical Requirements in Section VII of the tendering documents.

vii) "Implementation Schedule" means the Implementation Schedule in Section VII of the tendering documents.

viii) "Contract Price" means the price or prices defined in Article 2 (Contract Price and Terms of Payment) of the Contract Agreement.

ix) "Procurement Regulations" refers to the Regulations issued under the Public Procurement and Asset Disposal Act (2015).

x) "tendering documents" refers to the collection of documents issued by the Procuring Entity to instruct and inform potential suppliers of the processes for tendering, selection of the winning tender, and Contract formation, as well as the contractual conditions governing the relationship between the Procuring Entity and the Supplier. The General and Special Conditions of Contract, the Technical Requirements, and all other documents included in the tendering documents reflect the Procurement Regulations that the Procuring Entity is obligated to follow during procurement and administration of this Contract.

b) Entities

i) "Procuring Entity" means the entity purchasing the Information System, as **specified in the SCC.**

ii) "Project Manager" means the person **named as such in the SCC** or otherwise appointed by the Procuring Entity in the manner provided in GCC Clause 18.1 (Project Manager) to perform the duties delegated by the Procuring Entity.

iii) "Supplier" means the firm or Joint Venture whose tender to perform the Contract has been accepted by the Procuring Entity and is named as such in the Contract Agreement.

iv) "Supplier's Representative" means any person nominated by the Supplier and named as such in the Contract Agreement or otherwise approved by the Procuring Entity in the manner provided in GCC Clause18.2 (Supplier's Representative) to perform the duties delegated by the Supplier.

v) "Subcontractor" means any firm to whom any of the obligations of the Supplier, including preparation of any design or supply of any Information Technologies or other Goods or Services, is sub contracted directly or indirectly by the Supplier.

vi) "Adjudicator" means the person named in Appendix 2 of the Contract Agreement, appointed by agreement between the Procuring Entity and the n on or to settle a Dispute between the Procuring Entity and the Supplier referred to him or her by the parties, pursuant to GCC Clause 43.1 (Adjudication)

c) Scope

i) "Information System," also called "the System," means all the Information Technologies, Materials, and other Goods to be supplied, installed, integrated, and made operational (exclusive of the Supplier's Equipment), together with the Services to be carried out by the Supplier under the Contract.

ii) "Subsystem" means any subset of the System identified as such in the Contract that may be supplied, installed, tested, and commissioned individually before Commissioning of the entire System.

iii) "Information Technologies" means all information processing and communications-related hardware, Software, supplies, and consumable items that the Supplier is required to supply and install under the Contract.

iv) "Goods" means all equipment, machinery, furnishings, Materials, and other tangible items that the Supplier is required to supply or supply and install under the Contract, including, without limitation, the Information Technologies and Materials, but excluding the Supplier's Equipment.

v) "Services" means all technical, logistical, management, and any other Services to be provided by the Supplier under the Contract to supply, install, customize, integrate, and make operational the System. Such Services may include, but are not restricted to, activity management and quality assurance, design, development, customization, documentation, transportation, insurance, inspection, expediting, site preparation, installation, integration, training, data migration, Pre- commissioning, Commissioning, maintenance, and technical support.

vi) "The Project Plan" means the document to be developed by the Supplier and approved by the Procuring Entity, pursuant to GCC Clause 19, based on the requirements of the Contract and the Preliminary Project Plan included in the Supplier's tender. The "Agreed Project Plan" is the version of the Project Plan approved by the Procuring Entity, in accordance with GCC Clause 19.2. Should the Project Plan conflict with the Contract in any way, the relevant provisions of the Contract, including any amendments,

shall prevail.

vii) "Software" means that part of the System which are instructions that cause information processing Sub systems to perform in a specific manner or execute specific operations.

viii) "System Software" means Software that provides the operating and management instructions for the underlying hardware and other components and is identified as such in Appendix 4 of the Contract Agreement and such other Software as the parties may agree in writing to be Systems Software. Such System Software includes, but is not restricted to, micro-code embedded in hardware (i.e., "firmware"), operating systems, communications, system and network management, and utility software.

ix) "General-Purpose Software" means Software that supports general-purpose office and software development activities and is identified as such in Appendix 4 of the Contract Agreement and such other Software as the parties may agree in writing to be General-Purpose Software. Such General- Purpose Software may include, but is not restricted to, word processing, spreadsheet, generic database management, and application development software.

x) "Application Software" means Software formulated to perform specific business or technical functions and interface with the business or technical users of the System and is identified as such in Appendix4 of the Contract Agreement and such other Software as the parties may agree in writing to be Application Software.

xi) "Standard Software" means Software identified as such in Appendix 4 of the Contract Agreement and such other Software as the parties may agree in writing to be Standard Software.

xii) "Custom Software" means Software identified as such in Appendix 4 of the Contract Agreement and such other Software as the parties may agree in writing to be Custom Software.

xiii) "Source Code" means the database structures, dictionaries, definitions, program source files, and any other symbolic

representations necessary for the compilation, execution, and subsequent maintenance of the Software (typically, but not exclusively, required for Custom Software).

xiv) "Materials" means all documentation in printed or printable form and all instructional and informational aides in any form (including audio, video, and text) and on any medium, provided to the Procuring Entity under the Contract.

xv) "Standard Materials" means all Materials not specified as Custom Materials.

xvi) "Custom Materials" means Materials developed by the Supplier at the Procuring Entity's expense under the Contract and identified as such in Appendix 5 of the Contract Agreement and such other Materials as the parties may agree in writing to be Custom Materials. Custom Materials includes Materials created from Standard Materials.

xvii) "Intellectual Property Rights" means any and all copyright, moral rights, trademark, patent, and other intellectual and proprietary rights, title and interests worldwide, whether vested, contingent, or future, including without limitation all economic rights and all exclusive rights to reproduce, fix, adapt, modify, translate, create derivative works from, extractor re-utilize data from, manufacture, introduce into circulation, publish, distribute, sell, license, sub license, transfer, rent, lease, transmit or provide access electronically, broadcast, display, enter in to computer memory, or otherwise use any portion or copy, in whole or in part, in any form, directly or indirectly, or to authorize or assign others to do so.

xviii) "Supplier's Equipment" means all equipment, tools, apparatus, or things of every kind required in or for installation, completion and maintenance of the System that are to be provided by the Supplier, but excluding the Information Technologies, or other items forming part of the System.

d) Activities

i) "Delivery" means the transfer of the Goods from the Supplier to the Procuring Entity in accordance with the current edition

Incoterms specified in the Contract.

ii) "Installation" means that the System or a Subsystem as specified in the Contract is ready for Commissioning as provided in GCC Clause 26 (Installation).

iii) "Pre-commissioning" means the testing, checking, and any other required activity that may be specified in the Technical Requirements that are to be carried out by the Supplier in preparation for Commissioning of the System as provided in GCC Clause 26 (Installation).

iv) "Commissioning" means operation of the System or any Subsystem by the Supplier following Installation, which operation is to be carried out by the Supplier as provided in GCC Clause27.1 (Commissioning), for the purpose of carrying out Operational Acceptance Test (s).

v) "Operational Acceptance Tests" means the tests specified in the Technical Requirements and Agreed Project Plan to be carried out to ascertain whether the System, or a specified Sub system, is able to attain the functional and performance requirements specified in the Technical Requirements and Agreed Project Plan, in accordance with the provisions of GCC Clause 27.2 (Operational Acceptance Test).

vi) "Operational Acceptance" means the acceptance by the Procuring Entity of the System (or any Subsystem(s) where the Contract provides for acceptance of the System in parts), in accordance with GCC Clause 27.3 (Operational Acceptance).

e) Place and Time

i) "Supplier's Country" is the country in which the Supplier is legally organized, as named in the Contract Agreement.

ii) **Unless otherwise specified in the SCC** "Project Site (s)" means the place (s) in the Site Table in the Technical Requirements Section for the supply and installation of the System.

iii) "Eligible Country" means the countries and territories eligible for participation in procurements.

iv) "Day" means calendar day of the Gregorian Calendar.

v) "Week" means seven (7) consecutive Days, beginning the day of the week as is customary in Kenya.

vi) "Month" means calendar month of the Gregorian Calendar.

vii) "Year" means twelve (12) consecutive Months.

viii) "Effective Date" means the date of fulfillment of all conditions specified in Article 3 (Effective Date for Determining Time for Achieving Operational Acceptance) of the Contract Agreement, for the purpose of determining the Delivery, Installation, and Operational Acceptance dates for the System or Sub system(s).

ix) "Contract Period" is the time period during which this Contract governs the relations and obligations of the Procuring Entity and Supplier in relation to the System, as **unless otherwise specified in the SCC,** the Contract shall continue in force until the Information System and all the Services have been provided, unless the Contract is terminated earlier in accordance with the terms set out in the Contract**.**

x) "Defect Liability Period" (also referred to as the "Warranty Period") means the period of validity of the warranties given by the Supplier commencing at date of the Operational Acceptance Certificate of the System or Sub system(s), during which the Supplier is responsible for defects with respect to the System (or the relevant Sub-system[s]) as provided in GCC Clause 29 (Defect Liability).

xi) "The Coverage Period" means the Days of the Week and the hours of those Days during which maintenance, operational, and/ or technical support services (if any) must be available.

xii) The Post-Warranty Services Period" means the number of years **defined in the SCC** (if any), following the expiration of the Warranty Period during which the Supplier may be obligated to provide Software licenses, maintenance, and/ or technical support services for the System, either under this Contractor or under separate contract(s).

2. Contract Documents

2.1 Subject to Article 1.2 (Order of Precedence) of the Contract Agreement, all

documents forming part of the Contract (and all parts of these documents) are intended to be correlative, complementary, and mutually explanatory. The Contract shall be read as a whole.

3. Interpretation

3.1 Governing Language

3.1.1 All Contract Documents and related correspondence exchanged between Procuring Entity and Supplier shall be written in **the English Language** of these tendering documents**,** and the Contract shall be construed and interpreted in accordance with that language.

3.1.2 If any of the Contract Documents or related correspondence are prepared in a language other than the English Language under GCC Clause 3.1.1 above, the translation of such documents into the **English** language shall prevail in matters of interpretation. The originating party, with respect to such documents shall bear the costs and risks of such translation.

3.2 Singular and Plural

The singular shall include the plural and the plural the singular, except where the context otherwise requires.

3.3 Headings

The headings and marginal notes in the GCC are included for ease of reference and shall neither constitute a part of the Contract nor affect its interpretation.

3.4 Persons

Words importing persons or parties shall include firms, corporations, and government entities.

3.5 Incoterms

Unless inconsistent with any provision of the Contract, the meaning of any trade term and the rights and obligations of parties thereunder shall be as prescribed by the Incoterms.

Incoterms means international rules for interpreting trade terms published

by the International Chamber of Commerce (latest edition), 38 Cours Albert 1er, 75008 Paris, France.

3.6 Entire Agreement

The Contract constitutes the entire agreement between the Procuring Entity and Supplier with respect to the subject matter of Contract and supersedes all communications, negotiations, and agreements (whether written or oral) of parties with respect to the subject matter of the Contract made prior to the date of Contract.

3.7 Amendment

No amendment or other variation of the Contract shall be effective unless it is in writing, is dated, expressly refers to the Contract, and is signed by a duly authorized representative of each party to the Contract.

3.8 Independent Supplier

The Supplier shall be an independent contractor performing the Contract. The Contract does not create any agency, partnership, joint venture, or other joint relationship between the parties to the Contract.

Subject to the provisions of the Contract, the Supplier shall be solely responsible for the manner in which the Contract is performed. All employees, representatives, or Sub contractors engaged by the Supplier in connection with the performance of the Contract shall be under the complete control of the Supplier and shall not be deemed to be employees of the Procuring Entity, and nothing contained in the Contractor in any sub contract awarded by the Supplier shall be construed to create any contractual relationship between any such employees, representatives, or Sub contractors and the Procuring Entity.

3.9 Joint Venture

If the Supplier is a Joint Venture of two or more firms, all such firms shall be jointly and severally bound to the Procuring Entity for the fulfillment of the provisions of the Contract and shall designate one of such firms to act as a leader with authority to bind the Joint Venture. The composition or constitution of the Joint Venture shall not be altered without the prior

consent of the Procuring Entity.

3.10 Non-waiver

3.10.1 Subject to GCC Clause 3.10.2 below, no relaxation, forbearance, delay, or indulgence by either party in enforcing any of the terms and conditions of the Contractor the granting of time by either party to the other shall prejudice, affect, or restrict the rights of that party under the Contract, nor shall any waiver by either party of any breach of Contract operate as waiver of any subsequent or continuing breach of Contract.

3.10.2 Any waiver of a party's rights, powers, or remedies under the Contract must be in writing, must be dated and signed by an authorized representative of the party granting such waiver, and must specify the right and the extent to which it is being waived.

3.11 Severability

If any provision or condition of the Contract is prohibited or rendered invalid or unenforceable, such prohibition, invalidity, or unenforceability shall not affect the validity or enforceability of any other provisions and conditions of the Contract.

3.12 Country of Origin

"Origin" means the place where the Information Technologies, Materials, and other Goods for the System were produced or from which the Services are supplied. Goods are produced when, through manufacturing, processing, Software development, or substantial and major assembly or integration of components, a commercially recognized product results that is substantially different in basic characteristics or in purpose or utility from its components. The Origin of Goods and Services is distinct from the nationality of the Supplier and may be different.

4. Notices

4.1 Unless otherwise stated in the Contract, all notices to be given under the Contract shall be in writing and shall be sent, pursuant to GCC Clause 4.3 below, by personal delivery, air mail post, special courier, facsimile, electronic mail, or Electronic Data Interchange (EDI), with the following

provisions.

4.1.1 Any notice sent by facsimile, electronic mail, or EDI shall be confirmed within two (2) days after dispatch by notice sent by air mail post or special courier, except as otherwise specified in the Contract.

4.1.2 Any notice sent by air mail post or special courier shall be deemed (in the absence of evidence of earlier receipt) to have been delivered ten (10) days after dispatch. In proving the fact of dispatch, it shall be sufficient to show that the envelope containing such notice was properly addressed, stamped, and conveyed to the postal authorities or courier service for transmission by air mail or special courier.

4.1.3 Any notice delivered personally or sent by facsimile, electronic mail, or EDI shall be deemed to have been delivered on the date of its dispatch.

4.1.4 Either party may change its postal, facsimile, electronic mail, or EDI addresses for receipt of such notices by ten (10) days' notice to the other party in writing.

4.1.5 Notices shall be deemed to include any approvals, consents, instructions, orders, certificates, information and other communication to be given under the Contract.

4.1.6 Pursuant to GCC Clause 18, notices from/to the Procuring Entity are normally given by, or addressed to, the Project Manager, while notices from/to the Supplier are normally given by, or addressed to, the Supplier's Representative, or in its absence its deputy if any. If there is no appointed Project Manager or Supplier's Representative (or deputy), or if their related authority is limited by the SCC for GCC Clauses 18.1 or 18.2.2, or for any other reason, the Procuring Entity or Supplier may give and receive notices at their fallback addresses. The address of the Project Manager and the fallback address of the Procuring Entity are as **specified in the SCC** or as subsequently established/ amended. The address of the Supplier's Representative and the fallback address of the Supplier are as specified in Appendix 1 of the Contract Agreement or as subsequently established/amended.

5. Governing Law

5.1 The Contract shall be governed by and interpreted in accordance with the laws of Kenya.

5.2 Throughout the execution of the Contract, the Supplier shall comply with the import of goods and services prohibitions in Kenya when

a As a matter of law or official regulations, Kenya prohibits commercial relations with that country; or

b by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, Kenya prohibits any import of goods from that country or any payments to any country, person, or entity in that country.

6. Fraud and Corruption

6.1 The Procuring Entity requires compliance with the laws of Kenya on Anti-Corruption Guidelines and its prevailing sanctions policies and procedures as set forth in its statutes.

6.2 The Procuring Entity requires the Suppliers to disclose any commissions or fees that may have been paid or are to be paid to agents or any other party with respect to the tendering process or execution of the Contract. The information disclosed must include at least the name and address of the agent or other party, the amount and currency, and the purpose of the commission, gratuity or fee.

B. SUBJECT MATTER OF THE CONTRACT

7 Scope of the System

7.1 Unless otherwise expressly **limited in the SCC** or Technical Requirements, the Supplier's obligations cover the provision fall Information Technologies, Materials and other Goods as well as the performance of all Services required for the design, development, and implementation (including procurement, quality assurance, assembly, associated site preparation, Delivery, Pre-commissioning, Installation, Testing, and Commissioning) of the System, in accordance with the plans, procedures, specifications, drawings, codes, and any other documents specified in the Contract and the Agreed Project Plan.

7.2 The Supplier shall, unless specifically excluded in the Contract, perform all such work and/or supply all such items and Materials not specifically mentioned in the Contract but that can be reasonably inferred from the Contract as being required for attaining Operational Acceptance of the System as if such work and/or items and Materials were expressly mentioned in the Contract.

7.3 The Supplier's obligations (if any) to provide Goods and Services as implied by the Recurrent Cost tables of the Supplier's tender, such as consumables, spare parts, and technical services (e.g., maintenance, technical assistance, and operational support), areas **specified in the SCC,** including the relevant terms, characteristics, and timings.

8 Time for Commencement and Operational Acceptance

8.1 The Supplier shall commence work on the System with in the period **specified in the SCC,** and without prejudice to GCC Clause 28.2, the Supplier shall there after proceed with the System in accordance with the time schedule specified in the Implementation Schedule and any refinements made in the Agreed Project Plan.

8.2 The Supplier shall achieve Operational Acceptance of the System (or Subsystem(s) where a separate time for Operational Acceptance of such Sub system (s) is specified in the Contract) in accordance with the time schedule specified in the Implementation Schedule and any refinements made in the Agreed Project Plan, or within such extended time to which the Supplier shall be entitled under GCC Clause 40 (Extension of Time for Achieving Operational Acceptance).

9 Supplier's Responsibilities

9.1 The Supplier shall conduct all activities with due care and diligence, in accordance with the Contract and with the skill and care expected of a competent provider of information technologies, information systems, support, maintenance, training, and other related services, or in accordance with best industry practices. In particular, the Supplier shall provide and employ only technical personnel who are skilled and experienced in the irrespective callings and supervisory staff who are competent to adequately supervise the work at hand.

9.2 The Supplier confirms that it has entered into this Contract on the basis of

a proper examination of the data relating to the System provided by the Procuring Entity and on the basis of information that the Supplier could have obtained from a visual inspection of the site (if access to the site was available) and of other data readily available to the Supplier relating to the System as at the date twenty-eight (28) days prior to tender submission. The Supplier acknowledges that any failure to acquaint itself with all such data and information shall not relieve its responsibility for properly estimating the difficulty or cost of successfully performing the Contract.

9.3 The Supplier shall be responsible for timely provision of all resources, information, and decision making under its control that are necessary to reach a mutually Agreed Project Plan (pursuant to GCC Clause 19.2) within the time schedule specified in the Implementation Schedule. Failure to provide such resources, information, and decision-making may constitute grounds for termination pursuant to GCC Clause 41.2.

9.4 The Supplier shall acquire in its name all permits, approvals, and/or licenses from all local, state, or national government authorities or public service undertakings in Kenya that are necessary for the performance of the Contract, including, without limitation, visas for the Supplier's and Subcontractor's personnel and entry permits for all imported Supplier's Equipment. The Supplier shall acquire all other permits, approvals, and/or licenses that are not the responsibility of the Procuring Entity under GCC Clause 10.4 and that are necessary for the performance of the Contract.

9.5 The Supplier shall comply with all laws in force in Kenya. The laws will include all national, provincial, municipal, or other laws that affect the performance of the Contract and are binding upon the Supplier. The Supplier shall indemnify and hold harmless the Procuring Entity from and against any and all liabilities, damages, claims, fines, penalties, and expenses of whatever nature a rising or resulting from the violation of such laws by the Supplier or its personnel, including the Sub contractors and their personnel, but without prejudice to GCC Clause 10.1. The Supplier shall not indemnify the Procuring Entity to the extent that such liability, damage, claims, fines, penalties, and expenses were caused or contributed to by a fault of the Procuring Entity.

9.6 The Supplier shall, in all dealings with its labor and the labor of its Subcontractors currently employed on or connected with the Contract, pay due regard to all recognized festivals, official holidays, religious or other

customs, and all local laws and regulations pertaining to the employment of labor.

9.7 Any Information Technologies or other Goods and Services that will be incorporated in or be required for the System and other supplies shall have their Origin, as defined in GCC Clause 3.12, in a country that shall be an Eligible Country, as defined in GCC Clause 1.1 (e) (iv).

9.8 The Supplier shall conform to the sustainable procurement contractual provisions, if and as **specified in the SCC.**

9.9 **Unless otherwise specified in the SCC** the Supplier shall have no other Supplier responsibilities.

10 Procuring Entity's Responsibilities

10.1 The Procuring Entity shall ensure the accuracy of all information and/or data to be supplied by the Procuring Entity to the Supplier, except when otherwise expressly stated in the Contract.

10.2 The Procuring Entity shall be responsible for timely provision of all resources, information, and decision making under its control that are necessary to reach an Agreed Project Plan (pursuant to GCC Clause 19.2) within the time schedule specified in the Implementation Schedule. Failure to provide such resources, information, and decision making may constitute grounds for Termination pursuant to GCC Clause 41.3.1(b).

10.3 The Procuring Entity shall be responsible for acquiring and providing legal and physical possession of the site and access to it, and for providing possession of and access to all other are as reasonably required for the proper execution of the Contract.

10.4 If requested by the Supplier, the Procuring Entity shall use its best endeavors to assist the Supplier in obtaining in a timely and expeditious manner all permits, approvals, and/or licenses necessary for the execution of the Contract from all local, state, or national government authorities or public service undertakings that such authorities or under takings require the Supplier or Sub contractors or the personnel of the Supplier or Sub contractors, as the case may be, to obtain.

10.5 In such cases where the responsibilities of specifying and acquiring or upgrading telecommunications and/or electric power services falls to the Supplier, as specified in the Technical Requirements, SCC, Agreed Project Plan, or other parts of the Contract, the Procuring Entity shall use its best endeavors to assist the Supplier in obtaining such services in a timely and expeditious manner.

10.6 The Procuring Entity shall be responsible for timely provision of all resources, access, and information necessary for the Installation and Operational Acceptance of the System (including, but not limited to, any required telecommunications or electric power services), as identified in the Agreed Project Plan, except where provision of such items is explicitly identified in the Contract as being the responsibility of the Supplier. Delay by the Procuring Entity may result in an appropriate extension of the Time for Operational Acceptance, at the Supplier's discretion.

10.7 Unless otherwise specified in the Contractor agreed upon by the Procuring Entity and the Supplier, the Procuring Entity shall provide sufficient, properly qualified operating and technical personnel, as required by the Supplier to properly carry out Delivery, Pre-commissioning, Installation, Commissioning, and Operational Acceptance, at or before the time specified in the Implementation Schedule and the Agreed Project Plan.

10.8 The Procuring Entity will designate appropriate staff for the training courses to be given by the Supplier and shall make all appropriate logistical arrangements for such training as specified in the Technical Requirements, SCC, the Agreed Project Plan, or other parts of the Contract.

10.9 The Procuring Entity assumes primary responsibility for the Operational Acceptance Test (s) for the System, in accordance with GCC Clause 27.2, and shall be responsible for the continued operation of the System after Operational Acceptance. However, this shall not limit in anyway the Supplier's responsibilities after the date of Operational Acceptance otherwise specified in the Contract.

10.10 The Procuring Entity is responsible for performing and safely storing timely and regular backups of its data and Software in accordance with accepted data management principles, except where such responsibility is clearly assigned to the Supplier elsewhere in the Contract.

10.11 All costs and expenses involved in the performance of the obligations under this GCC Clause 10 shall be the responsibility of the Procuring Entity, save those to be incurred by the Supplier with respect to the performance of the Operational Acceptance Test (s), in accordance with GCC Clause 27.2.

10.12 **Unless otherwise specified in the SCC** the Procuring Entity shall have no other Procuring Entity responsibilities.

C. PAYMENT

11 Contract Price

11.1 The Contract Price shall be as specified in Article 2 (Contract Price and Terms of Payment) of the Contract Agreement.

11.2 Unless an adjustment clause is **provided for in the SCC,** the Contract Price shall be a firm lump sum not subject to any alteration, except in the event of a Change in the System pursuant to GCC Clause 39 or to other clauses in the Contract;

11.3 The Supplier shall be deemed to have satisfied itself as to the correctness and sufficiency of the Contract Price, which shall, except as otherwise provided for in the Contract, cover all its obligations under the Contract.

11.4 Where the contract price is different from the corrected tender price, in order to ensure the contractor is not paid less or more relative to the contract price (*which would be the tender price*), payment valuation certificates and variation orders on omissions and additions valued based on rates in the Bill of Quantities or schedule of rates in the Tender, will be adjusted by a plus or minus percentage. The percentage already worked out during tender evaluation is worked out as follows: *(corrected tender price–tender price)/ tender price X 100*.

12 Terms of Payment

12.1 The Supplier's request for payment shall be made to the Procuring Entity in writing, accompanied by an invoice describing, as appropriate, the System or Subsystem(s), Delivered, Pre-commissioned, Installed, and Operationally Accepted, and by documents submitted pursuant to GCC Clause 22.5 and upon fulfillment of other obligations stipulated in the

Contract. The Contract Price shall be paid as **specified in the SCC.**

12.2 No payment made by the Procuring Entity herein shall be deemed to constitute acceptance by the Procuring Entity of the System or any Sub system (s).

12.3 Payments shall be made promptly by the Procuring Entity, but in no case later than (sixty (60) days after submission of a valid invoice and upon satisfactorily performance of the contractual obligations by the Supplier. In the event that the Procuring Entity fails to make any payment by its respective due date or within the period set forth in the Contract, the Procuring Entity shall pay to the Supplier interest on the amount of such delayed payment at the rate (s) **specified in the SCC** for the period of delay until payment has been made in full, whether before or after judgment or arbitration award.

12.4 Payments shall be made in the currency (ies) specified in the Contract Agreement, pursuant to GCC Clause 11. For Goods and Services supplied locally, payments shall be made **as specified in the SCC.**

12.5 **Unless otherwise specified in the SCC,** payment of the foreign currency portion of the Contract Price for Goods supplied from outside Kenya shall be made to the Supplier through an irrevocable Form of credit opened by an authorized bank in the Supplier's Country and will be payable on presentation of the appropriate documents. It is agreed that the Form of credit will be subject to Article10 of the latest revision of *Uniform Customs and Practice for Documentary Credits*, published by the International Chamber of Commerce, Paris.

13 Securities

13.1 **Issuance of Securities**

The Supplier shall provide the securities specified below in favor of the Procuring Entity at the times and in the amount, manner, and form specified below.

13.2 **Advance Payment Security**

a) Unless otherwise specified in the SCC, the Supplier shall provide within twenty-eight (28) days of the notification of Contract award an Advance

Payment Security in the amount and currency of the Advance Payment specified in SCC for GCC Clause 12.1 above and valid until the System is Operationally Accepted.

b) The security shall be in the form provided in the tendering documents or in another form acceptable to the Procuring Entity. The amount of the security shall be reduced in proportion to the value of the System executed by and paid to the Supplier from time to time and shall automatically become null and void when the full amount of the advance payment has been recovered by the Procuring Entity. **Unless otherwise specified in the SCC,** the reduction in value and expiration of the Advance Payment Security are calculated as follows:

P*a/(100-a), where "P" is the sum of all payments effected so far to the Supplier (excluding the Advance Payment), and "a" is the Advance Payment expressed as a percentage of the Contract Price pursuant to the SCC for GCC Clause12.1.

The security shall be returned to the Supplier immediately after its expiration.

13.3 **Performance Security**

13.3.1 The Supplier shall, within thirty (30) days of the notification of Contract award, provide a security for the due performance of the Contract in the amount and currency **specified in the SCC**.

13.3.2 The security shall be a bank guarantee in the form provided in the Sample Contractual Forms Section of the tendering documents, or it shall be in another form acceptable to the Procuring Entity.

13.3.3 The security shall automatically become null and void once all the obligations of the Supplier under the Contract have been fulfilled, including, but not limited to, any obligations during the Warranty Period and any extensions to the period. The security shall be returned to the Supplier no later than twenty-eight (28) days after its expiration.

13.3.4 Upon Operational Acceptance of the entire System, the security shall be reduced to the amount specified in the SCC, on the date of the Operational Acceptance, so that the reduced security would only cover the remaining

warranty obligations of the Supplier.

14 Taxes and Duties

14.1 For Goods or Services supplied from outside and inside Kenya, the Supplier shall be entirely responsible for all taxes, stamp duties, license fees, and other such levies imposed outside Kenya and inside Kenya, and these duties or taxes shall be made part of the Contract Price in Article 2 of the Contract Agreement and the Price Schedule it refers to, in which case the duties and taxes will be the Supplier's responsibility.

14.2 For Goods or Services supplied locally, the Supplier shall be entirely responsible for all taxes, duties, license fees, etc., incurred until delivery of the contracted Goods or Services to the Procuring Entity. The only exception are taxes or duties, such as value-added or sales tax or stamp duty as apply to, or are clearly identifiable, on the invoices and provided they apply in Kenya, and only if these taxes, levies and/or duties are also excluded from the Contract Price in Article 2 of the Contract Agreement and the Price Schedule it refers to.

14.3 If any tax exemptions, reductions, allowances, or privileges may be available to the Supplier in Kenya, the Procuring Entity shall use its best efforts to enable the Supplier to benefit from any such tax savings to the maximum allowable extent.

14.4 For the purpose of the Contract, it is agreed that the Contract Price specified in Article 2 (Contract Price and Terms of Payment) of the Contract Agreement is based on the taxes, duties, levies, and charges prevailing at the date twenty-eight (28) days prior to the date of tender submission in Kenya (also called “Tax” in this GCC Clause 14.4). If any Tax rates are increased or decreased, a new Tax is introduced, an existing Tax is abolished, or any change in interpretation or application of any Tax occurs in the course of the performance of the Contract, which was or will be assessed on the Supplier, its Sub contractors, or their employees in connection with performance of the Contract, an equitable adjustment to the Contract Price shall be made to fully take into account any such change by addition to or reduction from the Contract Price, as the case may be.

D. Intellectual Property

15 Copyright

15.1 The Intellectual Property Rights in all Standard Software and Standard Materials shall remain vested in the owner of such rights.

15.2 The Procuring Entity agrees to restrict use, copying, or duplication of the Standard Software and Standard Materials in accordance with GCC Clause16, except that additional copies of Standard Materials may be made by the Procuring Entity for use within the scope of the project of which the System is apart, in the event that the Supplier does not deliver copies within thirty (30) days from receipt of a request for such Standard Materials.

15.3 The Procuring Entity's contractual rights to use the Standard Software or elements of the Standard Software may not be assigned, licensed, or otherwise transferred voluntarily except in accordance with the relevant license agreement or **unless otherwise specified in the SCC** to a legally constituted successor organization (e.g., a reorganization of a public entity formally authorized by the government or through a merger or acquisition of a private entity)**.**

15.4 **Unless otherwise specified in the SCC,** the Intellectual Property Rights in all Custom Software and Custom Materials specified in Appendices 4 and 5 of the Contract Agreement (if any) shall, at the date of this Contractor on creation of the rights (if later than the date of this Contract), vest in the Procuring Entity. The Supplier shall do and execute or arrange for the doing and executing of each necessary act, document, and thing that the Procuring Entity may consider necessary or desirable to perfect the right, title, and interest of the Procuring Entity in and to those rights. In respect of such Custom Software and Custom Materials, the Supplier shall ensure that the holder of am or alright in such an item does not assert it, and the Supplier shall, if requested to do so by the Procuring Entity and where permitted by applicable law, ensure that the holder of such a moral right waives it.

15.5 **Unless otherwise specified in the SCC**, escrow arrangements shall NOT be required.

16 Software License Agreements

16.1 Except to the extent that the Intellectual Property Rights in the Software vest in the Procuring Entity, the Supplier here by grants to the Procuring

Entity license to access and use the Software, including all inventions, designs, and marks embodied in the Software.

Such license to access and use the Software shall:

a) be:
   i. non-exclusive;
   ii. fully paid up and irrevocable (except that it shall terminate if the Contract terminates under GCC Clauses 41.1 or 41.3);
   iii. **unless otherwise specified in the SCC** valid throughout Kenya;
   iv. **unless otherwise specified in the SCC subject** to NO additional restrictions.

b) Permit the Software to be:
   i. used or copied for use on or with the computer(s) for which it was acquired (if specified in the Technical Requirements and/or the Supplier's tender), plus a backup computer(s) of the same or similar capacity, if the primary is (are) in operative, and during a reasonable transitional period when use is being transferred between primary and back up;
   ii. used or copied for use on or transferred to are placement computer (s), (and use on the original and replacement computer(s) may be simultaneous during a reasonable transitional period) provided that, if the Technical Requirements and/or the Supplier's tender specifies a class of computer to which the license is restricted, the replacement computer (s) is (are) within that class;
   iii. if the nature of the System is such as to permit such access, accessed from other computers connected to the primary and/or back up computer (s) by means of a local or wide-area network or similar arrangement, and used on or copied for use on those other computers to the extent necessary to that access;
   iv. reproduced for safe keeping or back up purposes;
   v. customized, adapted, or combined with other computer software for use by the Procuring Entity, provided that derivative software incorporating any substantial part of the delivered, restricted Software shall be subject to same restrictions as a reset forth in this Contract;

vi. **unless otherwise specified in the SCC,** disclosed to, and reproduced for use by, support service suppliers and their sub-contractors, (and the Procuring Entity may sub-license such persons to use and copy for use the Software) to the extent reasonably necessary to the performance of their support service contracts, subject to the same restrictions as a reset forth in this Contract; and

vii. **unless otherwise specified in the SCC** disclosed to, and reproduced for use by, NO other parties.

16.2 TheSupplierhastherighttoauditttheStandardSoftwaretoverifycompliancewit htheabovelicenseagreements.

Unless otherwise specified in the SCC, the Procuring Entity will make available to the Supplier, within seven
(7) days of a written request, accurate and up-to-date records of the number and location of copies, the number of authorized users, or any other relevant data required to demonstrate use of the Standard Software as per the license agreement. If and only if, expressly agreed in writing between the Procuring Entity and the Supplier, Procuring Entity will allow, under a pre-specified agreed procedure, the execution of embedded software functions under Supplier's control, and unencumbered transmission of resulting information on software usage.

17 Confidential Information

17.1 **Unless otherwise specified in the SCC,** the" Receiving Party" (either the Procuring Entity or the Supplier) shall keep confidential and shall not, without the written consent of the other party to this Contract ("the Disclosing Party"), divulge to any third party any documents, data, or other information of a confidential nature ("Confidential Information") connected with this Contract, and furnished directly or indirectly by the Disclosing Party prior to or during performance, or following termination, of this Contract.

17.2 For the purposes of GCC Clause 17.1, the Supplier is also deemed to be the Receiving Party of Confidential Information generated by the Supplier itself in the course of the performance of its obligations under the Contract

and relating to the businesses, finances, suppliers, employees, or other contacts of the Procuring Entity or the Procuring Entity's use of the System.

17.3 Notwithstanding GCC Clauses 17.1 and 17.2:

a) the Supplier may furnish to its Subcontractor Confidential Information of the Procuring Entity to the extent reasonably required for the Subcontractor to perform its work under the Contract; and

b) the Procuring Entity may furnish Confidential Information of the Supplier: (i) to its support service suppliers and their subcontractors to the extent reasonably required for them to perform their work under their support service contracts; and (ii) to its affiliates and subsidiaries, in which event the Receiving Party shall ensure that the person to whom it furnishes Confidential Information of the Disclosing Party is aware of and a tenderer by the Receiving Party's obligations under this GCC Clause 17 as if that person were party to the Contract in place of the Receiving Party.

17.4 The Procuring Entity shall not, without the Supplier's prior written consent, use any Confidential Information received from the Supplier for any purpose other than the operation, maintenance and further development of the System. Similarly, the Supplier shall not, without the Procuring Entity's prior written consent, use any Confidential Information received from the Procuring Entity for any purpose other than those that are required for the performance of the Contract.

17.5 The obligation of a party under GCC Clauses 17.1 through 17.4 above, however, shall not apply to that information which:

a) Now or hereafter enters the public domain through no fault of the Receiving Party;

b) can be proven to have been possessed by the Receiving Party at the time of disclosure and that was not previously obtained, directly or indirectly, from the Disclosing Party;

c) otherwise lawfully becomes available to the Receiving Party from a third party that has no obligation of confidentiality.

17.6 The above provisions of this GCC Clause17 shall not in any way modify any undertaking of confidentiality given by either of the parties to this Contract prior to the date of the Contract in respect of the System or any

part thereof.

17.7 **Unless otherwise specified in the SCC**, the provisions of this GCC Clause17 shall survive the termination, for whatever reason, of the Contract for three (3) years.

E. Supply, Installation, Testing, Commissioning, and Acceptance of the System

18 Representatives

18.1 Project Manager

If the Project Manager is not named in the Contract, then within fourteen (14) days of the Effective Date, the Procuring Entity shall appoint and notify the Supplier in writing of the name of the Project Manager. The Procuring Entity may from time to time appoint some other person as the Project Manager in place of the person previously so appointed and shall give a notice of the name of such other person to the Supplier without delay. No such appointment shall be made at such a time or in such a manner as to impede the progress of work on the System. Such appointment shall take effect only upon receipt of such notice by the Supplier. **Unless otherwise specified in the SCC** (if any), the Project Manager shall have the authority to represent the Procuring Entity on all day-to-day matters relating to the System or arising from the Contract, and shall normally be the person giving or receiving notices on behalf of the Procuring Entity pursuant to GCC Clause4.

18.2 Supplier's Representative

18.2.1 If the Supplier's Representative is not named in the Contract, then with in fourteen (14) days of the Effective Date, the Supplier shall appoint the Supplier's Representative and shall request the Procuring Entity in writing to approve the person so appointed. The request must be accompanied by a detailed curriculum vitae for the nominee, as well as a description of any other System or non-System responsibilities the nominee would retain while performing the duties of the Supplier's Representative. If the Procuring Entity does not object to the appointment within fourteen (14) days, the Supplier's Representative shall be deemed to have been approved. If the Procuring Entity objects to the appointment within

fourteen (14) days giving the reason therefor, then the Supplier shall appoint a replacement within fourteen (14) days of such objection in accordance with this GCC Clause 18.2.1.

18.2.2 **Unless otherwise specified in the SCC** (if any), the Supplier's Representative shall have the authority to represent the Supplier on all day-to-day matters relating to the System or arising from the Contract, and shall normally be the person giving or receiving notices on behalf of the Supplier pursuant to GCC Clause 4.

18.2.3 The Supplier shall not revoke the appointment of the Supplier's Representative without the Procuring Entity's prior written consent, which shall not be unreasonably withheld. If the Procuring Entity consents to such an action, the Supplier shall appoint another person of equal or superior qualifications as the Supplier's Representative, pursuant to the procedure set out in GCC Clause 18.2.1.

18.2.4 The Supplier's Representative and staff are obliged to work closely with the Procuring Entity's Project Manager and staff, act within their own authority, and a tenderer by directives issued by the Procuring Entity that are consistent with the terms of the Contract. The Supplier's Representative is responsible for managing the activities of its personnel and any subcontracted personnel.

18.2.5 The Supplier's Representative may, subject to the approval of the Procuring Entity (which shall not be unreasonably withheld), at any time delegate to any person any of the powers, functions, and authorities vested in him or her. Any such delegation may be revoked at any time. Any such delegation or revocation shall be subject to a prior notice signed by the Supplier's Representative and shall specify the powers, functions, and authorities there by delegated or revoked. No such delegation or revocation shall take effect unless and until the notice of it has been delivered.

18.2.6 Any act or exercise by any person of powers, functions and authorities so delegated to him or her in accordance with GCC Clause18.2.5shall be deemed to be an act or exercise by the Supplier's Representative.

18.3 Objections and Removals

18.3.1 The Procuring Entity may by notice to the Supplier object to any representative or person employed by the Supplier in the execution of the Contract who, in the reasonable opinion of the Procuring Entity, may have behaved inappropriately, be incompetent, or be negligent. The Procuring Entity shall provide evidence of the same, where upon the Supplier shall remove such person from work on the System.

18.3.2 If any representative or person employed by the Supplier is removed in accordance with GCC Clause18.3.1, the Supplier shall, where required, promptly appoint a replacement.

19 Project Plan

19.1 In close cooperation with the Procuring Entity and based on the Preliminary Project Plan included in the Supplier's tender, the Supplier shall develop a Project Plan encompassing the activities specified in the Contract. The contents of the Project Plan shall be as **specified in the SCC** and/ or Technical Requirements.

19.2 **Unless otherwise specified in the SCC**, within thirty (30) days from the Effective Date of the Contract, the Supplier shall present a Project Plan to the Procuring Entity. The Procuring Entity shall, within fourteen (14) days of receipt of the Project Plan, notify the Supplier of any respects in which it considers that the Project Plan does not adequately ensure that the proposed program of work, proposed methods, and/or proposed Information Technologies will satisfy the Technical Requirements and/or the SCC (in this Clause 19.2 called "non-conformities" below). The Supplier shall, within five (5) days of receipt of such notification, correct the Project Plan and resubmit to the Procuring Entity. The Procuring Entity shall, within five (5) days of resubmission of the Project Plan, notify the Supplier of any remaining non-conformities. This procedure shall be repeated as necessary until the Project Plan is free from non-conformities. When the Project Plan is free from non-conformities, the Procuring Entity shall provide confirmation in writing to the Supplier. This approved Project Plan ("the Agreed Project Plan") shall be contractually binding on the Procuring Entity and the Supplier.

19.3 If required, the impact on the Implementation Schedule of modifications agreed during finalization of the Agreed Project Plan shall be incorporated

in the Contract by amendment, in accordance with GCC Clauses 39 and 40.

19.4 The Supplier shall undertake to supply, install, test, and commission the System in accordance with the Agreed Project Plan and the Contract.

19.5 **Unless otherwise specified in the SCC**, the Supplier shall submit to the Procuring Entity Monthly Progress Reports summarizing:

i) Results accomplished during the prior period;

ii) cumulative deviations to date from schedule of progress milestones as specified in the Agreed Project Plan;

iii) corrective actions to be taken to return to planned schedule of progress; proposed revisions to planned schedule;

iv) other issues and outstanding problems; proposed actions to be taken;

v) resources that the Supplier expects to be provided by the Procuring Entity and/ or actions to be taken by the Procuring Entity in the next reporting period;

vi) other issues or potential problems the Supplier foresees that could impact on project progress and/or effectiveness.

19.6 The Supplier shall submit to the Procuring Entity other (periodic) reports **as specified in the SCC**.

20 Sub-contracting

20.1 Appendix 3 (List of Approved Subcontractors) to the Contract Agreement specifies critical items of supply or services and a list of Subcontractors for each item that are considered acceptable by the Procuring Entity. If no Subcontractors are listed for an item, the Supplier shall prepare a list of Subcontractors it considers qualified and wishes to be added to the list for such items. The Supplier may from time to time propose additions to or deletions from any such list. The Supplier shall submit any such list or any modification to the list to the Procuring Entity for its approval insufficient time so as not to impede the progress of work on the System. The Procuring Entity shall not withhold such approval unreasonably. Such approval by the Procuring Entity of a Subcontractor (s) shall not relieve the Supplier from any of its obligations, duties, or responsibilities under the Contract.

20.2 The Supplier may, at its discretion, select and employ Subcontractors for such critical items from those Subcontractors listed pursuant to GCC Clause 20.1. If the Supplier wishes to employ a Subcontractor not so listed, or subcontract an item not so listed, it must seek the Procuring Entity's prior approval under GCC Clause 20.3.

20.3 For items for which pre-approved Subcontractor lists have not been specified in Appendix 3 to the Contract Agreement, the Supplier may employ such Subcontractors as it may select, provided: (i) the Supplier notifies the Procuring Entity in writing at least twenty-eight (28) days prior to the proposed mobilization date for such Subcontractor; and (ii) by the end of this period either the Procuring Entity has granted its approval in writing or fails to respond. The Supplier shall not engage any Subcontract or to which the Procuring Entity has objected in writing prior to the end of the notice period. The absence of a written objection by the Procuring Entity during the above specified period shall constitute formal acceptance of the proposed Subcontractor. Except to the extent that it permits the deemed approval of the Procuring Entity of Subcontractors not listed in the Contract Agreement, nothing in this Clause, however, shall limit the rights and obligations of either the Procuring Entity or Supplier as they are specified in GCC Clauses 20.1 and 20.2, or in Appendix3 of the Contract Agreement.

21 Design and Engineering

21.1 Technical Specifications and Drawings

21.1.1 The Supplier shall execute the basic and detailed design and the implementation activities necessary for successful installation of the System in compliance with the provisions of the Contractor, where not so specified, in accordance with good industry practice.

The Supplier shall be responsible for any discrepancies, errors or omissions in the specifications, drawings, and other technical documents that it has prepared, whether such specifications, drawings, and other documents have been approved by the Project Manager or not, provided that such discrepancies, errors, or omissions are not because of in accurate information furnished in writing to the Supplier by or on behalf of the Procuring Entity.

21.1.2 The Supplier shall be entitled to disclaim responsibility for any design,

data, drawing, specification, or other document, or any modification of such design, drawings, specification, or other documents provided or designated by or on behalf of the Procuring Entity, by giving a notice of such disclaimer to the Project Manager.

21.2 Codes and Standards

Wherever references are made in the Contract to codes and standards in accordance with which the Contract shall be executed, the edition or the revised version of such codes and standards current at the date twenty-eight (28) days prior to date of tender submission shall apply. During Contract execution, any changes in such codes and standards shall be applied after approval by the Procuring Entity and shall be treated in accordance with GCC Clause 39.3.

21.3 Approval/ Review of Controlling Technical Documents by the Project Manager

21.3.2 **Unless otherwise specified in the SCC**, there will NO Controlling Technical Documents required. However, **if the SCC specifies** Controlling Technical Documents, the Supplier shall prepare and furnish such documents for the Project Manager's approval or review.

Any part of the System covered by or related to the documents to be approved by the Project Manager shall be executed only after the Project Manager's approval of these documents.

GCC Clauses 21.3.2 through 21.3.7 shall apply to those documents requiring the Project Manager's approval, but not to those furnished to the Project Manager for its review only.

21.3.3 Within fourteen (14) days after receipt by the Project Manager of any document requiring the Project Manager's approval in accordance with GCC Clause 21.3.1, the Project Manager shall either return one copy of the document to the Supplier with its approval endorsed on the document or shall notify the Supplier in writing of its disapproval of the document and the reasons for disapproval and the modifications that the Project Manager proposes. If the Project Manager fails to take such action within the fourteen (14) days, then the document shall be deemed to have been approved by the Project Manager.

21.3.4 The Project Manager shall not disapprove any document except on the grounds that the document does not comply with some specified provision

of the Contract or that it is contrary to good industry practice.

21.3.5 If the Project Manager disapproves the document, the Supplier shall modify the document and resubmit it for the Project Manager's approval in accordance with GCC Clause 21.3.2. If the Project Manager approves the document subject to modification(s), the Supplier shall make the required modification(s), and the document shall then be deemed to have been approved, subject to GCC Clause 21.3.5. The procedure set out in GCC Clauses 21.3.2 through 21.3.4 shall be repeated, as appropriate, until the Project Manager approves such documents.

21.3.6 If any dispute occurs between the Procuring Entity and the Supplier in connection with or arising out of the disapproval by the Project Manager of any document and/ or any modification (s) to a document that cannot be settled between the parties within a reasonable period, then, in case the Contract Agreement includes and names an Adjudicator, such dispute may be referred to the Adjudicator for determination in accordance with GCC Clause 43.1 (Adjudication). If such dispute is referred to an Adjudicator, the Project Manager shall give instructions as to whether and if so, how, performance of the Contract is to proceed. The Supplier shall proceed with the Contract in accordance with the Project Manager's instructions, provided that if the Adjudicator upholds the Supplier's view on the dispute and if the Procuring Entity has not given notice under GCC Clause 43.1.2, then the Supplier shall be reimbursed by the Procuring Entity for any additional costs incurred by reason of such instructions and shall be relieved of such responsibility or liability in connection with the dispute and the execution of the instructions as the Adjudicator shall decide, and the Time for Achieving Operational Acceptance shall be extended accordingly.

21.3.7 The Project Manager's approval, with or without modification of the document furnished by the Supplier, shall not relieve the Supplier of any responsibility or liability imposed upon it by any provisions of the Contract except to the extent that any subsequent failure results from modifications required by the Project Manager or inaccurate information furnished in writing to the Supplier by or on behalf of the Procuring Entity.

21.3.8 The Supplier shall not depart from any approved document unless the Supplier has first submitted to the Project Manager an amended document and obtained the Project Manager's approval of the document, pursuant to

the provisions of this GCC Clause 21.3. If the Project Manager requests any change in any already approved document and/or in any document based on such an approved document, the provisions of GCC Clause 39 (Changes to the System) shall apply to such request.

22 Procurement, Delivery, and Transport

22.1 Subject to related Procuring Entity's responsibilities pursuant to GCC Clauses 10 and 14, the Supplier shall manufacture or procure and transport all the Information Technologies, Materials, and other Goods in an expeditious and orderly manner to the Project Site.

22.2 Delivery of the Information Technologies, Materials, and other Goods shall be made by the Supplier in accordance with the Technical Requirements.

22.3 Early or partial deliveries require the explicit written consent of the Procuring Entity; which consent shall not be unreasonably withheld.

22.4 Packaging and Transportation

22.4.1 The Supplier shall provide such packing of the Goods as is required to prevent their damage or deterioration during shipment. The packing, marking, and documentation within and outside the packages shall comply strictly with the Procuring Entity's instructions to the Supplier.

22.4.2 The Supplier will bear responsibility for and cost of transport to the Project Sites in accordance with the terms and conditions used in the specification of prices in the Price Schedules, including the terms and conditions of the associated Inco terms.

22.4.3 **Unless otherwise specified in the SCC,** the Supplier shall be free to use transportation through carriers registered in any eligible country and to obtain insurance from any eligible source country.

22.4.4 **Unless otherwise specified in the SCC,** the Supplier will provide the Procuring Entity with shipping and other documents, as specified below:

22.4.5 For Goods supplied from outside Kenya:
Upon shipment, the Supplier shall notify the Procuring Entity and the insurance company contracted by the Supplier to provide cargo insurance

by cable, facsimile, electronic mail, or EDI with the full details of the shipment. The Supplier shall promptly send the following documents to the Procuring Entity by mail or courier, as appropriate, with a copy to the cargo insurance company:

a Two copies of the Supplier's invoice showing the description of the Goods, quantity, unit price, and total amount;

b usual transportation documents;

c insurance certificate;

d certificate (s) of origin; and

22.4.5 For Goods supplied locally (i.e., from within Kenya):

Upon shipment, the Supplier shall notify the Procuring Entity by cable, facsimile, electronic mail, or EDI with the full details of the shipment. The Supplier shall promptly send the following documents to the Procuring Entity by mail or courier, as appropriate:

a Two copies of the Supplier's invoice showing the Goods' description, quantity, unit price, and total amount;

b Delivery note, railway receipt, or truck receipt;

c certificate of insurance;

d certificate (s) of origin; and

e estimated time of arrival at the site.

22.4.6 Customs Clearance

a) The Procuring Entity will bear responsibility for, and cost of, customs clearance into Kenya in accordance with the particular Incoterm(s) used for Goods supplied from outside Kenya in the Price Schedules referred to by Article2 of the Contract Agreement.

b) At the request of the Procuring Entity, the Supplier will make available a representative or agent during the process of customs clearance in Kenya for goods supplied from outside Kenya. In the event of delays in customs clearance that are not the fault of the Supplier:

i) the Supplier shall be entitled to an extension in the Time for Achieving Operational Acceptance, pursuant to GCC Clause40;

ii) the Contract Price shall be adjusted to compensate the Supplier for any additional storage charges that the Supplier may incur as a result of the delay.

23 Product Upgrades

23.4 At any point during performance of the Contract, should technological advances be introduced by the Supplier for Information Technologies originally offered by the Supplier in its tender and still to be delivered, the Supplier shall be obligated to offer to the Procuring Entity the latest versions of the available Information Technologies having equal or better performance or functionality at the same or lesser unit prices, pursuant to GCC Clause39 (Changes to the System).

23.5 At any point during performance of the Contract, for Information Technologies still to be delivered, the Supplier will also pass on to the Procuring Entity any cost reductions and additional and/ or improved support and facilities that it offers to other clients of the Supplier in Kenya, pursuant to GCC Clause39 (Changes to the System).

23.6 During performance of the Contract, the Supplier shall offer to the Procuring Entity all new versions, releases, and updates of Standard Software, as well as related documentation and technical support services, within thirty (30) days of their availability from the Supplier to other clients of the Supplier in Kenya, and no later than twelve (12) months after they are released in the country of origin. In no case will the prices for these Software exceed those quoted by the Supplier in the Recurrent Costs tables in its tender.

23.7 **Unless otherwise specified in the SCC,** during the Warranty Period, the Supplier will provide at no additional cost to the Procuring Entity all new versions, releases, and updates for all Standard Software that are used in the System, within thirty (30) days of their availability from the Supplier to other clients of the Supplier in Kenya, and no later than twelve (12) months after they are released in the country of origin of the Software.

23.8 The Procuring Entity shall introduce all new versions, releases or updates of the Software within eighteen (18) months of receipt of a production-ready copy of the new version, release, or update, provided that the new version, release, or update does not adversely affect System operation or performance or require extensive reworking of the System. In cases where the new version, release, or update adversely affects System operation or performance, or requires extensive reworking of the System, the Supplier

shall continue to support and maintain the version or release previously in operation for as long as necessary to allow introduction of the new version, release, or update. In no case shall the Supplier stop supporting or maintaining a version or release of the Software less than twenty-four (24) months after the Procuring Entity receives a production-ready copy of a subsequent version, release, or update. The Procuring Entity shall use all reasonable endeavors to implement any new version, release, or update as soon as practicable, subject to the twenty-four-month-long stop date.

24 Implementation, Installation, and Other Services

24.1 The Supplier shall provide all Services specified in the Contract and Agreed Project Plan in accordance with the highest standards of professional competence and integrity.

24.2 Prices charged by the Supplier for Services, if not included in the Contract, shall be agreed upon in advance by the parties (including, but not restricted to, any prices submitted by the Supplier in the Recurrent Cost Schedules of its Tender) and shall not exceed the prevailing rates charged by the Supplier to other Procuring Entity's in Kenya for similar services.

25 Inspections and Tests

25.2 The Procuring Entity or its representative shall have the right to inspect and/or test any components of the System, as specified in the Technical Requirements, to confirm their good working order and/ or conformity to the Contract at the point of delivery and/ or at the Project Site.

25.3 The Procuring Entity or its representative shall be entitled to attend any such inspections and/or tests of the components, provided that the Procuring Entity shall bear all costs and expenses incurred in connection with such attendance, including but not limited to all inspection agent fees, travel, and related expenses.

25.4 Should the inspected or tested components fail to conform to the Contract, the Procuring Entity may reject the component (s), and the Supplier shall either replace the rejected component (s), or make alterations as necessary so that it meets the Contract requirements free of cost to the Procuring Entity.

25.5 The Project Manager may require the Supplier to carry out any inspection

and/or test not specified in the Contract, provided that the Supplier's reasonable costs and expenses incurred in the carrying out of such inspection and/ or test shall be added to the Contract Price. Further, if such inspection and/ or test impedes the progress of work on the System and/or the Supplier's performance of its other obligations under the Contract, due allowance will be made in respect of the Time for Achieving Operational Acceptance and the other obligations so affected.

25.6 If any dispute shall arise between the parties in connection with or caused by an inspection and/ or with regard to any component to be incorporated in the System that cannot be settled amicably between the parties within a reasonable period of time, either party may invoke the process pursuant to GCC Clause 43 (Settlement of Disputes), starting with referral of the matter to the Adjudicator in case an Adjudicator is included and named in the Contract Agreement.

26 Installation of the System

26.1. As soon as the System, or any Subsystem, has, in the opinion of the Supplier, been delivered, pre-commissioned, and made ready for Commissioning and Operational Acceptance Testing in accordance with the Technical Requirements, the SCC and the Agreed Project Plan, the Supplier shall so notify the Procuring Entity in writing.

26.2. The Project Manager shall, within fourteen (14) days after receipt of the Supplier's notice under GCC Clause 26.1, either issue an Installation Certificate in the form specified in the Sample Contractual Forms Section in the tendering documents, stating that the System, or major component or Subsystem (if Acceptance by major component or Sub system is specified pursuant to the SCC for GCC Clause27.2.1), has achieved Installation by the date of the Supplier's notice under GCC Clause 26.1, or notify the Supplier in writing of any defects and/or deficiencies, including, but not limited to, defects or deficiencies in the interoperability or integration of the various components and/or Subsystems making up the System. The Supplier shall use all reasonable endeavors to promptly remedy any defect and/ or deficiencies that the Project Manager has notified the Supplier of. The Supplier shall then promptly carryout retesting of the System or Sub system and, when in the Supplier's opinion the System or Sub system is ready for Commissioning and Operational

Acceptance Testing, notify the Procuring Entity in writing, in accordance with GCC Clause 26.1. The procedure set out in this GCC Clause shall be repeated, as necessary, until an Installation Certificate is issued.

26.3. If the Project Manager fails to issue the Installation Certificate and fails to inform the Supplier of any defects and/or deficiencies within fourteen (14) days after receipt of the Supplier's notice under GCC Clause 26.1,or if the Procuring Entity puts the System or a Subsystem in to production operation, then the System (or Subsystem) shall be deemed to have achieved successful Installation as of the date of the Supplier's notice or repeated notice, or when the Procuring Entity put the System in to production operation, as the case may be.

27 Commissioning and Operational Acceptance

27.1 Commissioning

27.1.1 Commissioning of the System (or Subsystem if specified pursuant to the SCC for GCC Clause 27.2.1) shall be commenced by the Supplier:

a) immediately after the Installation Certificate is issued by the Project Manager, pursuant to GCC Clause 26.2; or

b) as otherwise specified in the Technical Requirement or the Agreed Project Plan; or

c) immediately after Installation is deemed to have occurred, under GCC Clause 26.3.

27.1.2 The Procuring Entity shall supply the operating and technical personnel and all materials and information reasonably required to enable the Supplier to carry out its obligations with respect to Commissioning. Production use of the System or Subsystem(s) shall not commence prior to the start of formal Operational Acceptance Testing.

27.2 Operational Acceptance Tests

27.2.1 The Operational Acceptance Tests (and repeats of such tests) shall be the primary responsibility of the Procuring Entity (in accordance with GCC Clause 10.9), but shall be conducted with the full cooperation of the Supplier during Commissioning of the System (or major components or Subsystem[s]), to ascertain whether the System (or major component or Subsystem[s]) conforms to the Technical Requirements and meets the

standard of performance quoted in the Supplier's tender, including, but not restricted to, the functional and technical performance requirements. **Unless otherwise specified in the SCC**, the Operational Acceptance Tests during Commissioning will be conducted as specified in the Technical Requirements and/ or the Agreed Project Plan. At the Procuring Entity's discretion, Operational Acceptance Tests may also be performed on replacement Goods, upgrades and new version releases, and Goods that are added or field-modified after Operational Acceptance of the System.

27.2.2 If for reasons attributable to the Procuring Entity, the Operational Acceptance Test of the System (or Subsystem[s] or major components, pursuant to the SCC for GCC Clause 27.2.1) cannot be successfully completed within ninety (90) days from the date of Installation or any other period agreed upon in writing by the Procuring Entity and the Supplier, the Supplier shall be deemed to have fulfilled its obligations with respect to the technical and functional aspects of the Technical Specifications, SCC and/ or the Agreed Project Plan, and GCC Clause 28.2 and 28.3 shall not apply.

27.3 Operational Acceptance

27.3.1 Subject to GCC Clause 27.4 (Partial Acceptance) below, Operational Acceptance shall occur in respect of the System, when

a the Operational Acceptance Tests, as specified in the Technical Requirements, and/or SCC and/or the Agreed Project Plan have been successfully completed; or

b the Operational Acceptance Tests have not been successfully completed or have not been carried out for reasons that are attributable to the Procuring Entity within the period from the date of Installation or any other agreed-upon period as specified in GCC Clause 27.2.2 above; or

c the Procuring Entity has put the System into production or use for sixty (60) consecutive days. If the System is put into production or use in this manner, the Supplier shall notify the Procuring Entity and document such use.

27.3.2 At any time after any of the events set out in GCC Clause 27.3.1 have occurred, the Supplier may give a notice to the Project Manager

requesting the issue of an Operational Acceptance Certificate.

27.3.3 After consultation with the Procuring Entity, and within fourteen (14) days after receipt of the Supplier's notice, the Project Manager shall:

a Issue an Operational Acceptance Certificate; or

b Notify the Supplier in writing of any defect or deficiencies or other reason for the failure of the Operational Acceptance Tests; or

c Issue the Operational Acceptance Certificate, if the situation covered by GCC Clause 27.3.1 (b) arises.

27.3.4 The Supplier shall use all reasonable endeavors to promptly remedy any defect and/or deficiencies and/or other reasons for the failure of the Operational Acceptance Test that the Project Manager has notified the Supplier of. Once such remedies have been made by the Supplier, the Supplier shall notify the Procuring Entity, and the Procuring Entity, with the full cooperation of the Supplier, shall use all reasonable endeavors to promptly carry out retesting of the System or Sub system. Upon the successful conclusion of the Operational Acceptance Tests, the Supplier shall notify the Procuring Entity of its request for Operational Acceptance Certification, in accordance with GCC Clause 27.3.3. The Procuring Entity shall then issue to the Supplier the Operational Acceptance Certification in accordance with GCC Clause 27.3.3 (a), or shall notify the Supplier of further defects, deficiencies, or other reasons for the failure of the Operational Acceptance Test. The procedure set out in this GCC Clause27.3.4 shall be repeated, as necessary, until an Operational Acceptance Certificate is issued.

27.3.5 If the System or Subsystem fails to pass the Operational Acceptance Test(s) in accordance with GCC Clause 27.2, the neither:

a The Procuring Entity may consider terminating the Contract, pursuant to GCC Clause 41.2.2; or

b If the failure to achieve Operational Acceptance within the specified time period is a result of the failure of the Procuring Entity to fulfill its obligations under the Contract, then the Supplier shall be deemed to have fulfilled its obligations with respect to the relevant technical and functional aspects of the Contract, and GCC Clauses 30.3 and 30.4 shall not apply.

27.3.6 If within fourteen (14) days after receipt of the Supplier's notice the Project Manager fails to issue the Operational Acceptance Certificate or fails to inform the Supplier in writing of the justifiable reasons why the Project Manager has not issued the Operational Acceptance Certificate, the System or Subsystem shall be deemed to have been accepted as of the date of the Supplier's said notice.

27.4 Partial Acceptance

27.4.1 If so specified in the SCC for GCC Clause 27.2.1, Installation and Commissioning shall be carried out individually for each identified major component or Subsystem (s) of the System. In this event, the provisions in the Contract relating to Installation and Commissioning, including the Operational Acceptance Test, shall apply to each such major component or Subsystem individually, and Operational Acceptance Certificate (s) shall be issued accordingly for each such major component or Subsystem of the System, subject to the limitations contained in GCC Clause 27.4.2.

27.4.2 The issuance of Operational Acceptance Certificates for individual major components or Subsystems pursuant to GCC Clause 27.4.1 shall not relieve the Supplier of its obligation to obtain an Operational Acceptance Certificate for the System as an integrated whole (if so specified in the SCC for GCC Clauses 12.1 and 27.2.1) once all major components and Subsystems have been supplied, installed, tested, and commissioned.

27.4.3 In the case of minor components for the System that by their nature do not require Commissioning or an Operational Acceptance Test (e.g., minor fittings, furnishings or site works, etc.), the Project Manager shall issue an Operational Acceptance Certificate within fourteen (14) days after the fittings and/or furnishings have been delivered and/or installed or the site works have been completed. The Supplier shall, however, use all reasonable endeavors to promptly remedy any defects or deficiencies in such minor components detected by the Procuring Entity or Supplier.

F. Guarantees and Liabilities

28 Operational Acceptance Time Guarantee

28.1 The Supplier guarantees that it shall complete the supply, Installation, Commissioning, and achieve Operational Acceptance of the System (or Subsystems, pursuant to the SCC for GCC Clause 27.2.1) within the time

periods specified in the Implementation Schedule and/or the Agreed Project Plan pursuant to GCC Clause 8.2, or within such extended time to which the Supplier shall be entitled under GCC Clause 40 (Extension of Time for Achieving Operational Acceptance).

28.2 **Unless otherwise specified in the SCC**, if the Supplier fails to supply, install, commission, and achieve Operational Acceptance of the System (or Subsystems pursuant to the SCC for GCC Clause 27.2.1) within the time for achieving Operational Acceptance specified in the Implementation Schedule or the Agreed Project Plan, or any extension of the time for achieving Operational Acceptance previously granted under GCC Clause 40 (Extension of Time for Achieving Operational Acceptance), the Supplier shall pay to the Procuring Entity liquidated damages at the rate of one half of one percent per week as a percentage of the Contract Price (exclusive of Recurrent Costs if any), or the relevant part of the Contract Price if a Subsystem has not achieved Operational Acceptance. The aggregate amount of such liquidated damages shall in no event exceed the amount often (10) percent of the Contract Price (exclusive of Recurrent Costs if any). Once the Maximum is reached, the Procuring Entity may consider termination of the Contract, pursuant to GCC Clause 41.2.2.

28.3 **Unless otherwise specified in the SCC,** liquidated damages payable under GCC Clause 28.2 shall apply only to the failure to achieve Operational Acceptance of the System (and Subsystems) as specified in the Implementation Schedule and/or Agreed Project Plan. This Clause 28.3 shall not limit, however, any other rights or remedies the Procuring Entity may have under the Contract for other delays.

28.4 If liquidated damages are claimed by the Procuring Entity for the System (or Subsystem), the Supplier shall have no further liability whatsoever to the Procuring Entity in respect to the Operational Acceptance time guarantee for the System (or Subsystem). However, the payment of liquidated damages shall not in any way relieve the Supplier from any of its obligations to complete the System or from any other of its obligations and liabilities under the Contract.

29 Defect Liability

29.1 The Supplier warrants that the System, including all Information

Technologies, Materials, and other Goods supplied and Services provided, shall be free from defects in the design, engineering, Materials, and workmanship that prevent the System and/or any of its components from fulfilling the Technical Requirements or that limit in a material fashion the performance, reliability, or extensibility of the System and/or Subsystems. **Unless otherwise specified in the SCC**, there will be NO exceptions and/or limitations to this warranty with respect to Software (or categories of Software). Commercial warranty provisions of products supplied under the Contract shall apply to the extent that they do not conflict with the provisions of this Contract.

29.2 The Supplier also warrants that the Information Technologies, Materials, and other Goods supplied under the Contract are new, unused, and in corporate all recent improvements in design that materially affect the System's or Subsystem's ability to fulfill the Technical Requirements.

29.3 **Unless otherwise specified in the SCC,** the Supplier warrants that :(i) all Goods components to be incorporated into the System form part of the Supplier's and/or Subcontractor's current product lines, and (ii) they have been previously released to the market.

29.4 **Unless otherwise specified in the SCC**, the Warranty Period shall commence from the date of Operational Acceptance of the System (or of any major component or Subsystem for which separate Operational Acceptance is provided for in the Contract) and shall extend for thirty-six (36) months.

29.5 If during the Warranty Period any defect as described in GCC Clause 29.1 should be found in the design, engineering, Materials, and workmanship of the Information Technologies and other Goods supplied or of the Services provided by the Supplier, the Supplier shall promptly, in consultation and agreement with the Procuring Entity regarding appropriate remedying of the defects, and at its sole cost, repair, replace, or otherwise make good (as the Supplier shall, at its discretion, determine) such defect as well as any damage to the System caused by such defect. Any defective Information Technologies or other Goods that have been replaced by the Supplier shall remain the property of the Supplier.

29.6 The Supplier shall not be responsible for the repair, replacement, or making

good of any defect, or of any damage to the System arising out of or resulting from any of the following causes:

29.6.1 Improper operation or maintenance of the System by the Procuring Entity;

29.6.2 Normal wear and tear;

29.6.3 use of the System with items not supplied by the Supplier, unless otherwise identified in the Technical Requirements, or approved by the Supplier; or

29.6.4 modifications made to the System by the Procuring Entity, or a third party, not approved by the Supplier.

29.7 The Supplier's obligations under this GCC Clause 29 shall not apply to:

29.7.1 any materials that are normally consumed in operation or have a normal life shorter than the Warranty Period; or

29.7.2 any designs, specifications, or other data designed, supplied, or specified by or on behalf of the Procuring Entity or any matters for which the Supplier has disclaimed responsibility, in accordance with GCC Clause 21.1.2.

29.8 The Procuring Entity shall give the Supplier a notice promptly following the discovery of such defect, stating the nature of any such defect together with all available evidence. The Procuring Entity shall afford all reasonable opportunity for the Supplier to inspect any such defect. The Procuring Entity shall afford the Supplier all necessary access to the System and the site to enable the Supplier to perform its obligations under this GCC Clause 29.

29.9 The Supplier may, with the consent of the Procuring Entity, remove from the site any Information Technologies and other Goods that are defective, if the nature of the defect, and/or any damage to the System caused by the defect, is such that repairs cannot be expeditiously carried out at the site. If the repair, replacement, or making good is of such a character that it may affect the efficiency of the System, the Procuring Entity may give the Supplier notice requiring that tests of the defective part be made by the Supplier immediately upon completion of such remedial work, where upon the Supplier shall carry out such tests.

If such part fails the tests, the Supplier shall carry out further repair,

replacement, or making good (as the case maybe) until that part of the System passes such tests. The tests shall be agreed upon by the Procuring Entity and the Supplier.

29.10 **Unless otherwise specified in the SCC**, the response times and repair/replacement times for Warranty Defect Repair are specified in the Technical Requirements. Nevertheless, if the Supplier fails to commence the work necessary to remedy such defect or any damage to the System caused by such defect within two weeks the Procuring Entity may, following notice to the Supplier, proceed to do such work or contract a third party (or parties) to do such work, and the reasonable costs incurred by the Procuring Entity in connection with such work shall be paid to the Procuring Entity by the Supplier or may be deducted by the Procuring Entity from any monies due the Supplier or claimed under the Performance Security.

29.11 If the System or Subsystem cannot be used by reason of such defect and/or making good of such defect, the Warranty Period for the System shall be extended by a period equal to the period during which the System or Subsystem could not be used by the Procuring Entity because of such defect and/or making good of such defect.

29.12 Items substituted for defective parts of the System during the Warranty Period shall be covered by the Defect Liability Warranty for the remainder of the Warranty Period applicable for the part replaced or three (3) months, whichever is greater. For reasons of information security, the Procuring Entity may choose to retain physical possession of any replaced defective information storage devices.

29.13 At the request of the Procuring Entity and without prejudice to any other rights and remedies that the Procuring Entity may have against the Supplier under the Contract, the Supplier will offer all possible assistance to the Procuring Entity to seek warranty services or remedial action from any subcontracted third-party producers or licensor of Goods included in the System, including without limitation assignment or transfer in favor of the Procuring Entity of the benefit of any warranties given by such producers or licensors to the Supplier.

30 Functional Guarantees

30.1 The Supplier guarantees that, once the Operational Acceptance Certificate(s) has been issued, the System represents a complete, integrated solution to the Procuring Entity's requirements set forth in the Technical Requirements and it conforms to all other aspects of the Contract. The Supplier acknowledges that GCC Clause 27 regarding Commissioning and Operational Acceptance govern show technical conformance of the System to the Contract requirements will be determined.

30.2 If, for reasons attributable to the Supplier, the System does not conform to the Technical Requirements or does not conform to all other aspects of the Contract, the Supplier shall at its cost and expense make such changes, modifications, and/or additions to the System as may be necessary to conform to the Technical Requirements and meet all functional and performance standards. The Supplier shall notify the Procuring Entity upon completion of the necessary changes, modifications, and/or additions and shall request the Procuring Entity to repeat the Operational Acceptance Tests until the System achieves Operational Acceptance.

30.3 If the System (or Subsystem[s]) fails to achieve Operational Acceptance, the Procuring Entity may consider termination of the Contract, pursuant to GCC Clause 41.2.2, and forfeiture of the Supplier's Performance Security in accordance with GCC Clause 13.3 in compensation for the extra costs and delays likely to result from this failure.

31 Intellectual Property Rights Warranty

31.1 The Supplier here by represents and warrants that:

31.1.1 The System as supplied, installed, tested, and accepted;

31.1.2 Use of the System in accordance with the Contract; and

31.1.3 Copying of the Software and Materials provided to the Procuring Entity in accordance with the Contract do not and will not infringe any Intellectual Property Rights held by any third party and that it has all necessary rights or at its sole expense shall have secured in writing all transfer so frights and other consents necessary to make the assignments, licenses, and other transfers of Intellectual Property Rights and the warranties set forth in the Contract, and for the Procuring Entity to own or exercise all Intellectual Property Rights as

provided in the Contract. Without limitation, the Supplier shall secure all necessary written agreements, consents, and transfers of rights from its employees and other persons or entities whose services are used for development of the System.

32 Intellectual Property Rights Indemnity

32.1 The Supplier shall indemnify and hold harmless the Procuring Entity and its employees and officers from and against any and all losses, liabilities, and costs (including losses, liabilities, and costs incurred in defending a claim alleging such a liability), that the Procuring Entity or its employees or officers may suffer as a result of any infringement or alleged infringement of any Intellectual Property Rights by reason of:

32.1.1 Installation of the System by the Supplier or the use of the System, including the Materials, in the country where the site is located;

32.1.2 copying of the Software and Materials provided by the Supplier in accordance with the Agreement; and

32.1.3 sale of the products produced by the System in any country, except to the extent that such losses, liabilities, and costs a rise as a result of the Procuring Entity's breach of GCC Clause 32.2.

32.2 Such indemnity shall not cover any use of the System, including the Materials, other than for the purpose indicated by or to be reasonably inferred from the Contract, any infringement resulting from the use of the System, or any products of the System produced there by in association or combination with any other goods or services not supplied by the Supplier, where the infringement arises because of such association or combination and not because of use of the System in its own right.

32.3 Such indemnities shall also not apply if any claim of infringement:

32.3.1 Is asserted by apparent, subsidiary, or affiliate of the Procuring Entity's organization;

32.3.2 Is a direct result of a design mandated by the Procuring Entity's Technical Requirements and the possibility of such infringement was duly noted in the Supplier's Tender; or

32.3.3 Results from the alteration of the System, including the Materials, by the Procuring Entity or any persons other than the Supplier or a person authorized by the Supplier.

32.4 If any proceedings are brought or any claim is made against the Procuring Entity arising out of the matters referred to in GCC Clause 32.1, the Procuring Entity shall promptly give the Supplier notice of such proceedings or claims, and the Supplier may at its own expense and in the Procuring Entity's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim.

If the Supplier fails to notify the Procuring Entity within twenty-eight (28) days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Procuring Entity shall be free to conduct the same on its own behalf. Unless the Supplier has so failed to notify the Procuring Entity within the twenty-eight (28) days, the Procuring Entity shall make no admission that may be prejudicial to the defense of any such proceedings or claim. The Procuring Entity shall, at the Supplier's request, afford all available assistance to the Supplier in conducting such proceedings or claim and shall be reimbursed by the Supplier for all reasonable expenses incurred in so doing.

32.5 The Procuring Entity shall indemnify and hold harmless the Supplier and its employees, officers, and Subcontractors from and against any and all losses, liabilities, and costs (including losses, liabilities, and costs incurred in defending a claim alleging such a liability) that the Supplier or its employees, officers, or

Subcontractors may suffer as a result of any infringement or alleged infringement of any Intellectual Property Rights arising out of or in connection with any design, data, drawing, specification, or other documents or materials provided to the Supplier in connection with this Contract by the Procuring Entity or any persons (other than the Supplier) contracted by the Procuring Entity, except to the extent that such losses, liabilities, and costs arise as a result of the Supplier's breach of GCC Clause 32.8.

32.6 Such indemnity shall not cover

32.6.1 any use of the design, data, drawing, specification, or other documents or materials, other than for the purpose indicated by or to be reasonably inferred from the Contract;

32.6.2 any infringement resulting from the use of the design, data,

drawing, specification, or other documents or materials, or any products produced thereby, in association or combination with any other Goods or Services not provided by the Procuring Entity or any other person contracted by the Procuring Entity, where the infringement arises because of such association or combination and not because of the use of the design, data, drawing, specification, or other documents or materials in its own right.

32.7 Such indemnities shall also not apply:

32.7.1 If any claim of infringement is asserted by apparent, subsidiary, or affiliate of the Supplier's organization;

32.7.2 to the extent that any claim of infringement is caused by the alteration, by the Supplier, or any persons contracted by the Supplier, of the design, data, drawing, specification, or other documents or materials provided to the Supplier by the Procuring Entity or any persons contracted by the Procuring Entity.

32.8 If any proceedings are brought or any claim is made against the Supplier arising out of the matters referred to in GCC Clause 32.5, the Supplier shall promptly give the Procuring Entity notice of such proceedings or claims, and the Procuring Entity may at its own expense and in the Supplier's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim. If the Procuring Entity fails to notify the Supplier within twenty-eight (28) days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Supplier shall be free to conduct the same on its own behalf. Unless the Procuring Entity has so failed to notify the Supplier within the twenty-eight (28) days, the Supplier shall make no admission that may be prejudicial to the defense of any such proceedings or claim. The Supplier shall, at the Procuring Entity's request, afford all available assistance to the Procuring Entity in conducting such proceedings or claim and shall be reimbursed by the Procuring Entity for all reasonable expenses incurred in so doing.

33 Limitation of Liability

33.1 Provided the following does not exclude or limit any liabilities of either party in ways not permitted by applicable law:

33.1.1 the Supplier shall not be liable to the Procuring Entity, whether in contract,

tort, or otherwise, for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, provided that this exclusion shall not apply to any obligation of the Supplier to pay liquidated damages to the Procuring Entity; and

35.1.2 the aggregate liability of the Supplier to the Procuring Entity, whether under the Contract, in tort or otherwise, shall not exceed the total Contract Price, provided that this limitation shall not apply to any obligation of the Supplier to indemnify the Procuring Entity with respect to intellectual property rights infringement.

G. Risk Distribution

34 Transfer of Ownership

34.1 With the exception of Software and Materials, the ownership of the SCADA SYSTEM UPGRADE and other Goods shall be transferred to the Procuring Entity at the time of Delivery or otherwise under terms that may be agreed upon and specified in the Contract Agreement.

34.2 Ownership and the terms of usage of the Software and Materials supplied under the Contract shall be governed by GCC Clause 15 (Copyright) and any elaboration in the Technical Requirements.

34.3 Ownership of the Supplier's Equipment used by the Supplier and its Subcontractors in connection with the Contract shall remain with the Supplier or its Subcontractors.

35 Care of the System

35.1 The Procuring Entity shall be come responsible for the care and custody of the System or Subsystems upon their Delivery. The Procuring Entity shall make good at its own cost any loss or damage that may occur to the System or Subsystems from any cause from the date of Delivery until the date of Operational Acceptance of the System or Subsystems, pursuant to GCC Clause 27 (Commissioning and Operational Acceptance), except such loss or damage arising from acts or omissions of the Supplier, its employees, or subcontractors.

35.2 If any loss or damage occurs to the System or any part of the System by

reason of:

35.2.1.1 (in so far as they relate to the country where the Project Site is located) nuclear reaction, nuclear radiation, radioactive contamination, a pressure wave caused by aircraft or other aerial objects, or any other occurrences that an experienced contractor could not reasonably foresee, or if reasonably foreseeable could not reasonably make provision for or insure against, in so far as such risks are not normally insurable on the insurance market and are mentioned in the general exclusions of the policy of insurance taken out under GCC Clause 37;

35.2.1.2 Any use not in accordance with the Contract, by the Procuring Entity or any third party;

35.2.1.3 Any use of or reliance upon any design, data, or specification provided or designated by or on behalf of the Procuring Entity, or any such matter for which the Supplier has disclaimed responsibility in accordance with GCC Clause 21.1.2, the Procuring Entity shall pay to the Supplier all sums payable in respect of the System or Subsystems that have achieved Operational Acceptance, notwithstanding that the same be lost, destroyed, or damaged. If the Procuring Entity requests the Supplier in writing to make good any loss or damage to the System thereby occasioned, the Supplier shall make good the same at the cost of the Procuring Entity in accordance with GCC Clause 39. If the Procuring Entity does not request the Supplier in writing to make good any loss or damage to the System there by occasioned, the Procuring Entity shall either request a change in accordance with GCC Clause 39, excluding the performance of that part of the System there by lost, destroyed, or damaged, or, where the loss or damage affects a substantial part of the System, the Procuring Entity shall terminate the Contract pursuant to GCC Clause 41.1.

35.3 The Procuring Entity shall be liable for any loss of or damage to any Supplier's Equipment which the Procuring Entity has authorized to locate within the Procuring Entity's premises for use in fulfillment of Supplier's obligations under the Contract, except where such loss or damage arises from acts or omissions of the Supplier, its employees, or subcontractors.

36 Loss of or Damage to Property; Accident or Injury to Workers; Indemnification

36.1 The Supplier and each and every Subcontractor shall abide by the job safety, insurance, customs, and immigration measures prevalent and laws in force in Kenya.

36.2 Subject to GCC Clause 36.3, the Supplier shall indemnify and hold harmless the Procuring Entity and its employees and officers from and against any and all losses, liabilities and costs (including losses, liabilities, and costs incurred in defending a claim alleging such a liability) that the Procuring Entity or its employees or officers may suffer as a result of the death or injury of any person or loss of or damage to any property (other than the System, whether accepted or not) arising in connection with the supply, installation, testing, and Commissioning of the System and by reason of the negligence of the Supplier or its Subcontractors, or their employees, officers or agents, except any injury, death, or property damage caused by the negligence of the Procuring Entity, its contractors, employees, officers, or agents.

36.3 If any proceedings are brought or any claim is made against the Procuring Entity that might subject the Supplier to liability under GCC Clause 36.2, the Procuring Entity shall promptly give the Supplier notice of such proceedings or claims, and the Supplier may at its own expense and in the Procuring Entity's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim. If the Supplier fails to notify the Procuring Entity within twenty-eight (28) days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Procuring Entity shall be free to conduct the same on its own behalf. Unless the Supplier has so failed to notify the Procuring Entity within the twenty-eight (28) day period, the Procuring Entity shall make no admission that may be prejudicial to the defense of any such proceedings or claim. The Procuring Entity shall, at the Supplier's request, afford all available assistance to the Supplier in conducting such proceedings or claim and shall be reimbursed by the Supplier for all reasonable expenses incurred in so doing.

36.4 The Procuring Entity shall indemnify and hold harmless the Supplier and its employees, officers, and Subcontractors from any and all losses, liabilities, and costs (including losses, liabilities, and costs incurred in defending a claim alleging such a liability) that the Supplier or its

employees, officers, or Subcontractors may suffer as a result of the death or personal injury of any person or loss of or damage to property of the Procuring Entity, other than the System not yet achieving Operational Acceptance, that is caused by fire, explosion, or any other perils, in excess of the amount recoverable from insurances procured under GCC Clause 37 (Insurances), provided that such fire, explosion, or other perils were not caused by any act or failure of the Supplier.

36.5 If any proceedings are brought or any claim is made against the Supplier that might subject the Procuring Entity to liability under GCC Clause 36.4, the Supplier shall promptly give the Procuring Entity notice of such proceedings or claims, and the Procuring Entity may at its own expense and in the Supplier's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim. If the Procuring Entity fails to notify the Supplier within twenty-eight (28) days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Supplier shall be free to conduct the same on its own behalf. Unless the Procuring Entity has so failed to notify the Supplier within the twenty-eight (28) days, the Supplier shall make no admission that may be prejudicial to the defense of any such proceedings or claim. The Supplier shall, at the Procuring Entity's request, afford all available assistance to the Procuring Entity in conducting such proceedings or claim and shall be reimbursed by the Procuring Entity for all reasonable expenses incurred in so doing.

36.6 The party entitled to the benefit of an indemnity under this GCC Clause 36 shall take all reasonable measures to mitigate any loss or damage that has occurred. If the party fails to take such measures, the other party's liabilities shall be correspondingly reduced.

37 Insurances

37.1 The Supplier shall at its expense take out and maintain in effect or cause to be taken out and maintained in effect, during the performance of the Contract, the insurance set forth below. The identity of the insurers and the form of the policies shall be subject to the approval of the Procuring Entity, who should not unreasonably with hold such approval.

37.1.1 Cargo Insurance During Transport as applicable, 110 percent of the

price of the Information Technologies and other Goods in a freely convertible currency, covering the Goods from physical loss or damage during shipment through receipt at the Project Site.

37.1.2 Installation “All Risks” Insurance as applicable, 110 percent of the price of the Information Technologies and other Goods covering the Goods at the site from all risks of physical loss or damage (excluding only perils commonly excluded under “all risks insurance policies of this type by reputable insurers) occurring prior to Operational Acceptance of the System.

37.1.3 Third-Party Liability Insurance

On terms as **specified in the SCC,** covering bodily injury or death suffered by third parties (including the Procuring Entity's personnel) and loss of or damage to property (including the Procuring Entity's property and any Subsystems that have been accepted by the Procuring Entity) occurring in connection with the supply and installation of the Information System.

37.1.4 Automobile Liability Insurance

In accordance with the statutory requirements prevailing in Kenya, covering use of all vehicles used by the Supplier or its Subcontractors (whether owned or not by them) in connection with the execution of the Contract.

37.1.5 Other Insurance (if any), as **specified in the SCC.**

37.2 The Procuring Entity shall be named as co-insured under all insurance policies taken out by the Supplier pursuant to GCC Clause 37.1, except for the Third-Party Liability, and the Supplier's Subcontractors shall be named as co-insured under all insurance policies taken out by the Supplier pursuant to GCC Clause 37.1 except for Cargo Insurance During Transport. All insurer's rights of subrogation against such co-insured for losses or claims arising out of the performance of the Contract shall be waived under such policies.

37.3 The Supplier shall deliver to the Procuring Entity certificates of insurance (or copies of the insurance policies) as evidence that the required policies are in full force and effect.

37.4 The Supplier shall ensure that, where applicable, its Subcontractor(s) shall

take out and maintain in effect adequate insurance policies for their personnel and vehicles and for work executed by them under the Contract, unless such Subcontractors are covered by the policies taken out by the Supplier.

37.5 If the Supplier fails to take out and/or maintain in effect the insurance referred to in GCC Clause 37.1, the Procuring Entity may takeout and maintain in effect any such insurance and may from time to time deduct from any amount due to the Supplier under the Contract any premium that the Procuring Entity shall have paid to the insurer or may otherwise recover such amount as a debt due from the Supplier.

37.6 Unless otherwise provided in the Contract, the Supplier shall prepare and conduct all and any claims made under the policies affected by it pursuant to this GCC Clause 37, and all monies payable by any insurers shall be paid to the Supplier. The Procuring Entity shall give to the Supplier all such reasonable assistance as may be required by the Supplier in connection with any claim under the relevant insurance policies. With respect to insurance claims in which the Procuring Entity's interest is involved, the Supplier shall not give any release or make any compromise with the insurer without the prior written consent of the Procuring Entity. With respect to insurance claims in which the Supplier's interest is involved, the Procuring Entity shall not give any release or make any compromise with the insurer without the prior written consent of the Supplier.

38 Force Majeure

38.1 “Force Majeure” shall mean any event beyond the reasonable control of the Procuring Entity or of the Supplier, as the case may be, and which is unavoidable notwithstanding the reasonable care of the party affected and shall include, without limitation, the following:

38.1.1 war, hostilities, or war like operations (whether a state of war be declared or not), invasion, act of foreign enemy, and civil war;

38.1.2 rebellion, revolution, insurrection, mutiny, usurpation of civil or military government, conspiracy, riot, civil commotion, and terrorist acts;

38.1.3 confiscation, nationalization, mobilization, commandeering or requisition by or under the order of any government or dejure or

defacto authority or ruler, or any other act or failure to act of any local state or national government authority;

38.1.4 strike, sabotage, lockout, embargo, import restriction, port congestion, lack of usual means of public transportation and communication, industrial dispute, shipwreck, shortage or restriction of power supply, epidemics, quarantine, and plague;

38.1.5 earthquake, landslide, volcanic activity, fire, flood or inundation, tidal wave, typhoon or cyclone, hurricane, storm, lightning, or other inclement weather condition, nuclear and pressure waves, or other natural or physical disaster;

38.1.6 failure, by the Supplier, to obtain the necessary export permit (s) from the governments of the Country(s) of Origin of the Information Technologies or other Goods, or Supplier's Equipment provided that the Supplier has made all reasonable efforts to obtain the required export permit(s), including the exercise of due diligence in determining the eligibility of the System and all of its components for receipt of the necessary export permits.

38.2 If either party is prevented, hindered, or delayed from or in performing any of its obligations under the Contract by an event of Force Majeure, then it shall notify the other in writing of the occurrence of such event and the circumstances of the event of Force Majeure within fourteen (14) days after the occurrence of such event.

38.3 The party who has given such notice shall be excused from the performance or punctual performance of its obligations under the Contract for so long as the relevant event of Force Majeure continues and to the extent that such party's performance is prevented, hindered, or delayed. The Time for Achieving Operational Acceptance shall be extended in accordance with GCC Clause 40 (Extension of Time for Achieving Operational Acceptance).

38.4 The party or parties affected by the event of Force Majeure shall use reasonable efforts to mitigate the effect of the event of Force Majeure upon its or their performance of the Contract and to fulfill its or their obligations under the Contract, but without prejudice to either party's right to terminate

the Contract under GCC Clause 38.6.

38.5 No delay or nonperformance by either party to this Contract caused by the occurrence of any event of Force Majeure shall:

38.5.1 Constitute a default or breach of the Contract;

38.5.2 (subject to GCC Clauses 35.2, 38.3, and 38.4) give rise to any claim for damages or additional cost or expense occasioned by the delay or nonperformance, if, and to the extent that, such delay or non-performance is caused by the occurrence of an event of Force Majeure.

38.6 If the performance of the Contract is substantially prevented, hindered, or delayed for a single period of more than sixty (60) days or an aggregate period of more than one hundred and twenty (120) days on account of one or more events of Force Majeure during the time period covered by the Contract, the parties will attempt to develop a mutually satisfactory solution, failing which, either party may terminate the Contract by giving a notice to the other.

38.7 In the event of termination pursuant to GCC Clause 38.6, the rights and obligations of the Procuring Entity and the Supplier shall be as specified in GCC Clauses 41.1.2 and 41.1.3.

38.8 Notwithstanding GCC Clause 38.5, Force Majeure shall not apply to any obligation of the Procuring Entity to make payments to the Supplier under this Contract.

H. Change in Contract Elements

39 Changes to the System

39.1 Introducing a Change

39.1.1 A Change may involve, but is not restricted to, the substitution of updated Information Technologies and related Services in accordance with GCC Clause 23 (Product Upgrades).

39.1.2 The Supplier may from time to time during its performance of the Contract propose to the Procuring Entity (with a copy to the Project Manager) any Change that the Supplier considers necessary or desirable

to improve the quality or efficiency of the System. The Procuring Entity may at its discretion approve or reject any Change proposed by the Supplier.

39.1.3 Notwithstanding GCC Clauses 39.1.1 and 39.1.2, no change made necessary because of any default of the Supplier in the performance of its obligations under the Contract shall be deemed to be a Change, and such change shall not result in any adjustment of the Contract Price or the Time for Achieving Operational Acceptance.

39.1.4 The procedure on how to proceed with and execute Changes is specified in GCC Clauses 39.2 and 39.3, and further details and sample forms are provided in the Sample Contractual Forms Section in the tendering documents.

39.1.5 Moreover, the Procuring Entity and Supplier will agree, during development of the Project Plan, to a date prior to the scheduled date for Operational Acceptance, after which the Technical Requirements for the System shall be "frozen." Any Change initiated after this time will be dealt with after Operational Acceptance.

39.1 Changes Originating from Procuring Entity

39.1.1 If the Procuring Entity proposes a Change pursuant to GCC Clauses 39.1.1, it shall send to the Supplier a "Request for Change Proposal," requiring the Supplier to prepare and furnish to the Project Manager as soon as reasonably practicable a "Change Proposal," which shall include the following:

a Brief description of the Change;

b Impact on the Time for Achieving Operational Acceptance;

c Detailed estimated cost of the Change;

d Effect on Functional Guarantees (if any);

e Effect on any other provisions of the Contract.

39.1.2 Prior to preparing and submitting the "Change Proposal," the Supplier shall submit to the Project Manager a "Change Estimate Proposal," which shall be an estimate of the cost of preparing the Change Proposal, plus a first approximation of the suggested approach and cost for

implementing the changes. Upon receipt of the Supplier's Change Estimate Proposal, the Procuring Entity shall do one of the following:

a accept the Supplier's estimate with instructions to the Supplier to proceed with the preparation of the Change Proposal;

b advise the Supplier of any part of its Change Estimate Proposal that is unacceptable and request the Supplier to review its estimate;

c advise the Supplier that the Procuring Entity does not intend to proceed with the Change.

39.1.3 Upon receipt of the Procuring Entity's instruction to proceed under GCC Clause 39.2.2 (a), the Supplier shall, with proper expedition, proceed with the preparation of the Change Proposal, in accordance with GCC Clause 39.2.1. The Supplier, at its discretion, may specify a validity period for the Change Proposal, after which if the Procuring Entity and Supplier has not reached agreement in accordance with GCC Clause 39.2.6, then GCC Clause 39.2.7 shall apply.

39.1.4 The pricing of any Change shall, as far as practicable, be calculated in accordance with the rates and prices included in the Contract. If the nature of the Change is such that the Contract rates and prices are in equitable, the parties to the Contract shall agree on other specific rates to be used for valuing the Change.

39.1.5 If before or during the preparation of the Change Proposal it becomes apparent that the aggregate impact of compliance with the Request for Change Proposal and with all other Change Orders that have already become binding upon the Supplier under this GCC Clause 39 would be to increase or decrease the Contract Price as originally set forth in Article 2 (Contract Price) of the Contract Agreement by more than fifteen (15) percent, the Supplier may give a written notice of objection to this Request for Change Proposal prior to furnishing the Change Proposal. If the Procuring Entity accepts the Supplier's objection, the Procuring Entity shall withdraw the proposed Change and shall notify the Supplier in writing of its acceptance.

The Supplier's failure to so object to a Request for Change Proposal shall neither affect its right to object to any subsequent requested Changes or Change Orders, nor affect its right to take into account,

when making such subsequent objection, the percentage increase or decrease in the Contract Price that any Change not objected to by the Supplier represents.

39.1.6 Upon receipt of the Change Proposal, the Procuring Entity and the Supplier shall mutually agree upon all matters contained in the Change Proposal. Within fourteen (14) days after such agreement, the Procuring Entity shall, if it intends to proceed with the Change, issue the Supplier a Change Order. If the Procuring Entity is unable to reach a decision within fourteen (14) days, it shall notify the Supplier with details of when the Supplier can expect a decision. If the Procuring Entity decides not to proceed with the Change for whatever reason, it shall, within the said period of fourteen (14) days, notify the Supplier accordingly. Under such circumstances, the Supplier shall be entitled to reimbursement of all costs reasonably incurred by it in the preparation of the Change Proposal, provided that these do not exceed the amount given by the Supplier in its Change Estimate Proposal submitted in accordance with GCC Clause 39.2.2.

39.1.7 If the Procuring Entity and the Supplier cannot reach agreement on the price for the Change, an equitable adjustment to the Time for Achieving Operational Acceptance, or any other matters identified in the Change Proposal, the Change will not be implemented. However, this provision does not limit the rights of either party under GCC Clause 6 (Settlement of Disputes).

39.1 Changes Originating from Supplier

If the Supplier proposes a Change pursuant to GCC Clause 39.1.2, the Supplier shall submit to the Project Manager a written "Application for Change Proposal," giving reasons for the proposed Change and including the information specified in GCC Clause 39.2.1. Upon receipt of the Application for Change Proposal, the parties shall follow the procedures outlined in GCC Clauses 39.2.6 and 39.2.7. However, should the Procuring Entity choose not to proceed or the Procuring Entity and the Supplier cannot come to agreement on the change during any validity period that the Supplier may specify in its Application for Change Proposal, the Supplier shall not be entitled to recover the costs of preparing the Application for Change Proposal, unless subject to **Value engineering.**

The Supplier may prepare, at its own cost, a value engineering proposal at any time during the performance of the Contract. (a) to (d) above, the amount to be paid to the Supplier shall be the full increase in the Contract Price.

40 Extension of Time for Achieving Operational Acceptance

40.1 The time(s) for achieving Operational Acceptance specified in the Schedule of Implementation shall be extended if the Supplier is delayed or impeded in the performance of any of its obligations under the Contract by reason of any of the following:

40.1.1 Any Change in the System as provided in GCC Clause39 (Change in the Information System);

40.1.2 Any occurrence of Force Majeure as provided in GCC Clause 38 (Force Majeure);

40.1.3 Default of the Procuring Entity; or

40.1.4 Any other matter specifically mentioned in the Contract; by such period as shall be fair and reasonable in all the circumstances and as shall fairly reflect the delay or impediment sustained by the Supplier.

40.2 Except where otherwise specifically provided in the Contract, the Supplier shall submit to the Project Manager a notice of a claim for an extension of the time for achieving Operational Acceptance, together with particulars of the event or circumstance justifying such extension as soon as reasonably practicable after the commencement of such event or circumstance. As soon as reasonably practicable after receipt of such notice and supporting particulars of the claim, the Procuring Entity and the Supplier shall agree upon the period of such extension. In the event that the Supplier does not accept the Procuring Entity's estimate of a fair and reasonable time extension, the Supplier shall be entitled to refer the matter to the provisions for the Settlement of Disputes pursuant to GCC Clause 43.

40.3 The Supplier shall at all times use its reasonable efforts to minimize any delay in the performance of its obligations under the Contract.

41 Termination

41.1 Termination for Procuring Entity's Convenience

41.1.1 The Procuring Entity may at any time terminate the Contract for any

reason by giving the Supplier a notice of termination that refers to this GCC Clause 41.1.

41.1.2 Upon receipt of the notice of termination under GCC Clause 41.1.1, the Supplier shall either as soon as reasonably practical or upon the date specified in the notice of termination

a) cease all further work, except for such work as the Procuring Entity may specify in the notice of termination for the sole purpose of protecting that part of the System already executed, or any work required to leave the site in a clean and safe condition;

b) terminate all subcontracts, except those to be assigned to the Procuring Entity pursuant to GCC Clause (d) (ii) below;

c) Remove all Supplier's Equipment from the site, repatriate the Supplier's and its Sub contractors' personnel from the site, remove from the site any wreckage, rubbish, and debris of any kind;

d) In addition, the Supplier, subject to the payment specified in GCC Clause 41.1.3, shall

i) deliver to the Procuring Entity the parts of the System executed by the Supplier up to the date of termination;

ii) to the extent legally possible, assign to the Procuring Entity all right, title, and benefit of the Supplier to the System, or Subsystem, as at the date of termination, and, as may be required by the Procuring Entity, in any subcontracts concluded between the Supplier and its Subcontractors;

iii) deliver to the Procuring Entity all nonproprietary drawings, specifications, and other documents prepared by the Supplier or its Subcontractors as of the date of termination in connection with the System.

41.1.3 In the event of termination of the Contract under GCC Clause 41.1.1, the Procuring Entity shall pay to the Supplier the following amounts:

a) The Contract Price, properly attributable to the parts of the System executed by the Supplier as of the date of termination;

b) The costs reasonably incurred by the Supplier in the removal of the Supplier's Equipment from the site and in the repatriation of

the Supplier's and its Subcontractors 'personnel;

c) any amount to be paid by the Supplier to its Subcontractors in connection with the termination of any subcontracts, including any cancellation charges;

d) costs incurred by the Supplier in protecting the System and leaving the site in a clean and safe condition pursuant to GCC Clause 41.1.2(a); and

e) the cost of satisfying all other obligations, commitments, and claims that the Supplier may in good faith have undertaken with third parties in connection with the Contract and that are not covered by GCC Clauses 41.1.3 (a) through (d) above.

41.2 Termination for Supplier's Default

41.2.1 The Procuring Entity, without prejudice to any other rights or remedies it may possess, may terminate the Contract forth within the following circumstances by giving a notice of termination and its reasons there for to the Supplier, referring to this GCC Clause41.2:

a) If the Supplier becomes bankrupt or in solvent, has a receiving order issued against it, compounds with its creditors, or, if the Supplier is a corporation, a resolution is passed or order is made for its winding up (other than a voluntary liquidation for the purposes of amalgamation or reconstruction), a receiver is appointed over any part of its under taking or assets, or if the Supplier takes or suffers any other analogous action in consequence of debt;

b) If the Supplier assigns or transfers the Contractor any right or interest, there in in violation of the provision of GCC Clause 42 (Assignment); or

c) If the Supplier, in the judgment of the Procuring Entity has engaged in Fraud and Corruption, as defined in paragraph 2.2a. of the Appendix to the GCC, in competing for or in executing the Contract, including but Not limited to willful misrepresentation of facts concerning ownership of Intellectual Property Rights in, or proper authorization and/or licenses from the owner to offer, the hardware, software, or materials provided

under this Contract.

41.2.2 If the Supplier:

a) Has abandoned or repudiated the Contract;

b) Has without valid reason failed to commence work on the System promptly;

c) Persistently fails to execute the Contract in accordance with the Contract or persistently neglects to carry out its obligations under the Contract without just cause;

d) Refuses or is unable to provide sufficient Materials, Services, or labor to execute and complete the System in the manner specified in the Agreed Project Plan furnished under GCC Clause 19 at rates of progress that give reasonable assurance to the Procuring Entity that the Supplier can attain Operational Acceptance of the System by the Time for Achieving Operational Acceptance as extended; then the Procuring Entity may, without prejudice to any other rights it may possess under the Contract, give a notice to the Supplier stating the nature of the default and requiring the Supplier to remedy the same. If the Supplier fails to remedy or to take steps to remedy the same with in fourteen (14) days of its receipt of such notice, then the Procuring Entity may terminate the Contract forthwith by giving a notice of termination to the Supplier that refers to this GCC Clause 41.2.

41.2.3 Upon receipt of the notice of termination under GCC Clauses 41.2.1 or 41.2.2, the Supplier shall, either immediately or upon such date as is specified in the notice of termination:

a) cease all further work, except for such work as the Procuring Entity may specify in the notice of termination for the sole purpose of protecting that part of the System already executed or any work required to leave the site in a clean and safe condition;

b) terminate all subcontracts, except those to be assigned to the Procuring Entity pursuant to GCC Clause (d) below;

c) deliver to the Procuring Entity the parts of the System executed by the Supplier up to the date of termination;

d) to the extent legally possible, assign to the Procuring Entity all right, title and benefit of the Supplier to the System or Subsystems as at the date of termination, and, as may be required by the Procuring Entity, in any subcontracts concluded between the Supplier and its Subcontractors;

e) deliver to the Procuring Entity all drawings, specifications, and other documents prepared by the Supplier or its Subcontractors as at the date of termination in connection with the System.

41.2.4 The Procuring Entity may enter upon the site, expel the Supplier, and complete the System itself or by employing any third party. Upon completion of the System or at such earlier date as the Procuring Entity thinks appropriate, the Procuring Entity shall give notice to the Supplier that such Supplier's Equipment will be returned to the Supplier at or near the site and shall return such Supplier's Equipment to the Supplier in accordance with such notice. The Supplier shall thereafter without delay and at its cost remove or arrange removal of the same from the site.

41.2.5 Subject to GCC Clause 41.2.6, the Supplier shall be entitled to be paid the Contract Price attributable to the portion of the System executed as at the date of termination and the costs, if any, incurred in protecting the System and in leaving the site in a clean and safe condition pursuant to GCC Clause 41.2.3 (a). Any sums due the Procuring Entity from the Supplier accruing prior to the date of termination shall be deducted from the amount to be paid to the Supplier under this Contract.

41.2.6 If the Procuring Entity completes the System, the cost of completing the System by the Procuring Entity shall be determined. If the sum that the Supplier is entitled to be paid, pursuant to GCC Clause 41.2.5, plus the reasonable costs incurred by the Procuring Entity in completing the System, exceeds the Contract Price, the Supplier shall be liable for such excess. If such excess is greater than the sums due the Supplier under GCC Clause41.2.5, the Supplier shall pay the balance to the Procuring Entity, and if such excess is less than the

sums due the Supplier under GCC Clause 41.2.5, the Procuring Entity shall pay the balance to the Supplier. The Procuring Entity and the Supplier shall agree, in writing, on the computation described above and the manner in which any sums shall be paid.

41.3 Termination by Supplier

41.3.1 If:

a) the Procuring Entity has failed to pay the Supplier any sum due under the Contract within the specified period, has failed to approve any invoice or supporting documents without just cause **pursuant to the SCC,** or commits a substantial breach of the Contract, the Supplier may give a notice to the Procuring Entity that requires payment of such sum, with interest on this sum as stipulated in GCC Clause 12.3, requires approval of such invoice or supporting documents, or specifies the breach and requires the Procuring Entity to remedy the same, as the case may be. If the Procuring Entity fails to pay such sum together with such interest, fails to approve such invoice or supporting documents or give its reasons for withholding such approval, fails to remedy the breach or take steps to remedy the breach within fourteen (14) days after receipt of the Supplier's notice; or

b) the Supplier is unable to carry out any of its obligations under the Contract for any reason attributable to the Procuring Entity, including but not limited to the Procuring Entity's failure to provide possession of or access to the site or other areas or failure to obtain any governmental permit necessary for the execution and/or completion of the System; then the Supplier may give a notice to the Procuring Entity of such events, and if the Procuring Entity has failed to pay the outstanding sum, to approve the invoice or supporting documents, to give its reasons for withholding such approval, or to remedy the breach within twenty-eight (28) days of such notice, or if the Supplier is still unable to carry out any of its obligations under the Contract for any reason attributable to the Procuring Entity within twenty-eight (28) days of the said notice, the Supplier may by a further notice to the Procuring Entity referring to this GCC Clause

41.3.1, forth with terminate the Contract.

41.3.2 The Supplier may terminate the Contract immediately by giving a notice to the Procuring Entity to that effect, referring to this GCC Clause 41.3.2, if the Procuring Entity becomes bankrupt or insolvent, has a receiving order issued against it, compounds with its creditors, or, being a corporation, if a resolution is passed or order is made for its winding up (other than a voluntary liquidation for the purposes of amalgamation or reconstruction), a receiver is appointed over any part of its undertaking or assets, or if the Procuring Entity takes or suffers any other analogous action in consequence of debt.

41.3.3 If the Contract is terminated under GCC Clauses 41.3.1 or 41.3.2, then the Supplier shall immediately:

a) Cease all further work, except for such work as may be necessary for the purpose of protecting that part of the System already executed, or any work required to leave the site in a clean and safe condition;

b) Terminate all subcontracts, except those to be assigned to the Procuring Entity pursuant to Clause 41.3.3
(d) (ii);

c) remove all Supplier's Equipment from the site and repatriate the Supplier's and its Subcontractor's personnel from the site.

d) In addition, the Supplier, subject to the payment specified in GCC Clause 41.3.4, shall:

   i) deliver to the Procuring Entity the parts of the System executed by the Supplier up to the date of termination;

   ii) to the extent legally possible, assign to the Procuring Entity all right, title, and benefit of the Supplier to the System, or Subsystems, as of the date of termination, and, as may be required by the Procuring Entity, in any subcontracts concluded between the Supplier and its Subcontractors;

   iii) to the extent legally possible, deliver to the Procuring Entity all drawings, specifications, and other documents prepared by the Supplier or its Subcontractors as of the date of termination in connection with the System.

41.3.4 If the Contract is terminated under GCC Clauses 41.3.1or 41.3.2, the Procuring Entity shall pay to the Supplier all payments specified in GCC Clause 41.1.3 and reasonable compensation for all loss, except for loss of profit, or damage sustained by the Supplier arising out of, in connection with, or in consequence of such termination.

41.3.5 Termination by the Supplier pursuant to this GCC Clause 41.3 is without prejudice to any other rights or remedies of the Supplier that may be exercised in lieu of or in addition to rights conferred by GCC Clause 41.3.

41.3.6 In this GCC Clause 41, the expression "portion of the System executed" shall include all work executed, Services provided, and all Information Technologies, or other Goods acquired (or subject to a legally binding Obligation to purchase) by the Supplier and used or intended to be used for the purpose of the System, up to and including the date of termination.

41.4 In this GCC Clause 41, in calculating any monies due from the Procuring Entity to the Supplier, account shall be taken of any sum previously paid by the Procuring Entity to the Supplier under the Contract, including any advance payment paid **pursuant to the SCC.**

42 Assignment

Neither the Procuring Entity nor the Supplier shall, without the express prior written consent of the other, assign to any third party the Contractor any part thereof, or any right, benefit, obligation, or interest there in or there under, except that the Supplier shall be entitled to assign either absolutely or by way of charge any monies due and payable to it or that may become due and payable to it under the Contract.

I. Settlement of Disputes

43 Settlement of Disputes

43.1 Adjudication

43.1.1 If any dispute of any kind what so ever shall arise between the Procuring Entity and the Supplier in connection with or arising out of the Contract, including without prejudice to the generality of the

foregoing, any question regarding its existence, validity, or termination, or the operation of the System (whether during the progress of implementation or after its achieving Operational Acceptance and whether before or after the termination, abandonment, or breach of the Contract), the parties shall seek to resolve any such dispute **by mutual consultation**. If the parties fail to resolve such a dispute by mutual consultation within fourteen (14) days after one party has notified the other in writing of the dispute, then, if the Contract Agreement in Appendix2 includes and names an Adjudicator, the dispute shall, within another fourteen (14) days, be referred in writing by either party to the Adjudicator, with a copy to the other party. If there is no Adjudicator specified in the Contract Agreement, the mutual consultation period stated above shall last twenty-eight (28) days (instead of fourteen), upon expiry of which either party may move to the notification of arbitration pursuant to GCC Clause43.2.1.

43.1.2 The Adjudicator shall give his or her decision in writing to both parties within twenty-eight (28) days of the dispute being referred to the Adjudicator. If the Adjudicator has done so, and no notice of intention to commence arbitration has been given by either the Procuring Entity or the Supplier within fifty-six (56) days of such reference, the decision shall become final and binding upon the Procuring Entity and the Supplier. Any decision that has become final and binding shall be implemented by the parties forth with.

43.1.3 The Adjudicator shall be paid an hourly fee at the rate specified in the Contract Agreement plus reasonable expenditures incurred in the execution of duties as Adjudicator, and these costs shall be divided equally between the Procuring Entity and the Supplier.

43.1.4 Should the Adjudicator resign or die, or should the Procuring Entity and the Supplier agree that the Adjudicator is not fulfilling his or her functions in accordance with the provisions of the Contract, a new Adjudicator shall be jointly appointed by the Procuring Entity and the Supplier. Failing agreement between the two within twenty-eight (28) days, the new Adjudicator shall be appointed at the request of either party by the Appointing Authority **specified in the SCC,** or, if no

Appointing Authority is **specified in SCC,** the Contract shall, from this point onward and until the parties may otherwise agree on an Adjudicator or an Appointing Authority, be implemented as if there is no Adjudicator.

43.2 Arbitration

43.2.1 If

a) the Procuring Entity or the Supplier is dissatisfied with the Adjudicator's decision and acts before this decision has become final and binding pursuant to GCC Clause 43.1.2, or

b) the Adjudicator fails to give a decision within the allotted time from referral of the dispute pursuant to GCC Clause 43.1.2, and the Procuring Entity or the Supplier acts within the following fourteen (14) days, or

c) in the absence of an Adjudicator from the Contract Agreement, the mutual consultation pursuant to GCC Clause 43.1.1 expires without resolution of the dispute and the Procuring Entity or the Supplier acts within the following fourteen (14) days, then either the Procuring Entity or the Supplier may act to give notice to the other party, with a copy for information to the Adjudicator incase an Adjudicator had been involved, of its intention to commence arbitration, as provided below, as to the matter in dispute, and no arbitration in respect of this matter may be commenced unless such notice is given.

43.2.2 Any dispute in respect of which a notice of intention to commence arbitration has been given, in accordance with GCC Clause 43.2.1, shall be finally settled by arbitration. Arbitration may be commenced prior to or after Installation of the Information System.

43.2.3 Arbitration proceedings shall be conducted in accordance with the rules of procedure **specified in the SCC.**

43.3 Notwithstanding any reference to the Adjudicator or arbitration in this clause,

a) The parties shall continue to perform their respective obligations under the Contract unless they otherwise agree;

b) The Procuring Entity shall pay the Supplier any monies due the

Supplier.

SECTION VII - SPECIAL CONDITIONS OF CONTRACT

Special Conditions of Contract

The following Special Conditions of Contract (SCC) shall supplement or amend the General Conditions of Contract (GCC). Whenever there is a conflict, the provisions of the SCC shall prevail over those in the General Conditions of Contract. For the purposes of clarity, any referenced GCC clause numbers are indicated in the left column of the SCC.

A. Contract and Interpretation

1. Definitions (GCC Clause1)

GCC 1.1 (b) (i)	The Procuring Entity is: ***KENYA PIPELINE COMPANY LIMITED.***
GCC 1.1 (b) (ii)	The Project Manager is: ***KPC Information Technology and Communication Manager].***
GCC 1.1 (e) (ix)	***There are no Special Conditions associated with GCC 1.1 (e) (x).*** ***[Note: The GCC default specifies the Contract Period as when all the Supplier's obligations are completed. If there is a reason to set a hard-and-fast calendar date for the Contract Period to end, then specify here]***
GCC 1.1 (e) (xii)	The Post-Warranty Services Period **12 *months*** starting with the completion of the Warranty Period.

2. Notices (GCC Clause 4)

GCC 4.3	Address of the Project Manager: Information Technology and Communication Manager Fallback address of the Procuring Entity: Kenya Pipeline company Limited P. O Box 73442 – 00200 **NAIROBI**

B. Subject Matter of Contract

3. Scope of the System (GCC Clause 7)

GCC 7.3	NOT APPLICABLE

4. Time for Commencement and Operational Acceptance (GCC Clause 8)

GCC 8.1	The Supplier shall commence work on the System within: 14 days from the Effective Date of the Contract or a date to be agreed upon in writing by the parties.

5. Supplier's Responsibilities (GCC Clause 9)

C. Payment

6. Contract Price (GCC Clause 11)

GCC 11.2	Adjustments to the Contract Price shall be as follows***: NOT APPLICABLE***

7. Terms of Payment (GCC Clause 12)

GCC 12.1	Payment terms (a) 5% of SCADA System contract price upon submission and approval of detailed Survey report and detailed Functional Design Specification (FDS). (b) 25% of SCADA system contract price upon provision of proof of procurement in terms of verifiable orders, delivery notes, payment documents etc. of all required equipment and software licenses for SCADA and Central UPS.

	(c) 5% of SCADA System contract price upon SCADA system and Central UPS Training at manufacturers' premises. (d) 5% of Contract value up completion of SCADA and UPS system Factory Acceptance Test. (e) 25% of SCADA system price on upon completion of installation, testing and commissioning NCC SCADA system (including Energy management, ATG, Truckloading, metering suite, alarms management, pipeline scheduling modules etc.), Central UPS, and furniture at Nairobi Control Center. (f) 15% of SCADA system price on upon completion of installation, testing and commissioning slave systems for SCADA at PS14, PS8, PS25, PS27 & PS28 as per specifications. (g) 15% of SCADA system price on upon completion of installation, testing and commissioning Disaster Recovery system for SCADA system at remote site. (h) 5% of SCADA system price upon completion of installation and commissioning of Pipeline Energy Management system, approval of submitted "As Built" drawings/ documentation, Training manuals for the entire SCADA, UPS, and Associated systems. The payment terms maybe negotiated at contract signing.
GCC 12.3	The Procuring Entity shall pay to the Supplier interest on the delayed payments as provided for in the PPDA 2015 and PPADR 2020
GCC 12.4	The Supplier will invoice the Procuring Entity in Kenya Shillings as provided for in tender document.

8. Securities (GCC Clause 13)

GCC 13.3.1	The Performance Security shall be 10% percent of the Contract

	Price,
GCC 13.3.4	NOT APPLICABLE

D. Intellectual Property

9. Copyright (GCC Clause 15)

GCC 15.3	***There are no Special Conditions of Contract applicable to GCC Clause 15.3***
GCC 15.4	***There are no Special Conditions of Contract applicable to GCC Clause 15.4***
GCC 15.5	***There are no Special Conditions of Contract applicable to GCC Clause 15.5***

10. Software License Agreements (GCC Clause 16)

GCC 16.1 (a) (iv)	***There are no Special Conditions of Contract applicable to GCC Clause 16.1 (a) (iv)***
GCC 16.1 (b) (vi)	***There are no Special Conditions of Contract applicable to GCC Clause 16.1 (b) (vi)***
GCC 16.1 (b) (vii)	***There are no Special Conditions of Contract applicable to GCC Clause 16.1 (b) (vii)***
GCC 16.2	***There are no Special Conditions of Contract applicable to GCC Clause 16.2***

11. Confidential Information (GCC Clause 17)

GCC 17.1	***There are no Special Conditions of Contract applicable to GCC***

	Clause 17.1

E. Supply, Installation, Testing, Commissioning, and Acceptance of the System

12.Representatives (GCC Clause 18)

GCC 18.1	***There are no Special Conditions of Contract applicable to GCC Clause 18.1***
GCC 18.2.2	***There are no Special Conditions of Contract applicable to GCC Clause 18.2.2***

13.Project Plan (GCC Clause 19)

GCC 19.1	Supplier to submit Project Plan that shall address the following subject**:** ***(a) Project Organization and Management Sub-Plan, including management authorities, responsibilities, and contacts, as well as task, time and resource-bound schedules (in GANTT format);*** ***(b) Implementation Sub-Plan;*** ***(c) Training Sub-Plan;*** ***(d) Testing and Quality Assurance Sub-Plan;***
GCC 19.6	***The Supplier shall submit to the Procuring Entity:*** ***(i) inspection and quality assurance reports***

14.Design and Engineering (GCC Clause 21)

GCC 21.3.1	***There are no Special Conditions of Contract applicable to GCC Clause 21.3.1.***

15.Product Upgrades (GCC Clause 23)

GCC 23.4	***There are no Special Conditions of Contract applicable to GCC Clause 23.4.*** *[Note: Mandating that all new versions, releases, and updates of Standard Software will be passed on for free during the Warranty Period is a comprehensive requirement, the benefits of which must be balanced against the perceived costs in the mind of the successful Tenderer at the time of tender submission. To require the Supplier to provide for free only new releases and updates, but agreeing that it would be reimbursed for the supply of complete new versions might be more cost-effective. For example, this may be particularly appropriate when the Procuring Entity would not benefit from costs of migrating its business applications to an entirely new version of the underlying database system if such a version came out during a three Warranty Period. Another approach may be to shorten the time period during which updates, etc., would have to be supplied for free, for example, to only the first year of the Warranty Period; or alternatively, a narrower set of Standard Software could be covered.]*

16.Inspections and Tests (GCC Clause 25)

GCC 25	***There are no Special Conditions of Contract applicable to GCC Clause 25.*** *[Note: Procuring Entity's may wish to consider employing qualified inspectors to inspect and certify the Information Technologies, Materials, and other Goods prior to shipment. This can minimize the number of cases where the Procuring Entity receives shipped goods that do not conform to the Technical Requirements and shorten the repair or replacement time.]*

17.Commissioning and Operational Acceptance (GCC Clause 27)

GCC 27.2.1	***There are no Special Conditions of Contract applicable to GCC Clause 27.2.1.***

F. Guarantees and Liabilities

18.Operational Acceptance Time Guarantee (GCC Clause 28)

GCC 28.2	*One half of one percent (0.5%) per week and ten percent (10%) of the total.*
GCC 28.3	***There are no Special Conditions of Contract applicable to GCC Clause 28.3.***

19.Defect Liability (GCC Clause 29)

GCC 29.1	***There are no Special Conditions of Contract applicable to GCC Clause 29.1.***
GCC 29.4	The Warranty period is one year
GCC 29.10	***There are no Special Conditions of Contract applicable to GCC Clause 29.10*** **[*Note:*** *Typically, the Procuring Entity should develop a set of response times for different degrees of seriousness of the defects and/or categories of IT and/or specific Subsystems. The most appropriate and economical set of response times are highly dependent on the specific System, its use, and the relevant conditions in Kenya.* *The GCC specifies that the Supplier must commence work on warranty defects within a maximum of two weeks; else the Procuring Entity may contract-in such services at the Supplier's expense. The Procuring Entity may wish to shorten or lengthen this period in the SCC. The time specified must strike a reasonable balance between the response time the typical qualified Supplier can physically achieve and the importance of maintaining continued System operation. If too short a time period is specified, Suppliers will need to protect themselves by adding a contingency to their tender prices.]*

20.Functional Guarantees (GCC Clause 30)

GCC 30	***There are no Special Conditions of Contract applicable to GCC Clause 30.***

G.Risk Distribution

21.Insurances (GCC Clause 37)

GCC 37.1 (c)	The Supplier shall obtain any appropriate insurance cover that will be agreed upon at the point of contract signing
GCC 37.1 (e)	***There are no Special Conditions of Contract applicable to GCC Clause 37.1 (e).***

H.Change in Contract Elements

22.Changes to the System (GCC Clause 39)

GCC 39.4.3	**Value Engineering – NOT APPLICABLE**

I. Settlement of Disputes

23.Settlement of Disputes (GCC Clause 43)

GCC 43.1.4	**NOT APPLICABLE**
GCC 43.2.3	The procuring entity and the contractor shall make every effort to resolve amicably by direct informal negotiations any disagreement or dispute arising between them under or in connection with the contract. If after thirty (30) days from the commencement of such informal negotiations both parties have been unable to resolve amicably a contract dispute either party may require that the be referred to the high court of Kenya.

SECTION VIII - CONTRACT FORMS

Notes to the Procuring Entity on preparing the Contract Forms.

Performance Security: Pursuant to GCC Clause 13.3, the successful Tenderer is required to provide the Performance Security within twenty-eight (28) days of notification of Contract award.

Advance Payment Security: Pursuant to Clause13.2, the successful Tenderer is required to provide a bank *guarantee* securing the Advance Payment, if the SCC related to GCC Clause 12.1 provides for an Advance Payment.

Installation and Operational Acceptance Certificates: Recommended formats for these certificates are *included* in this SPD. Unless the Procuring Entity has good reason to require procedures that differ from those recommended, or to require different wording in the certificates, the procedures and forms shall be included unchanged. If the Procuring Entity wishes to amend the recommended procedures and/ or certificates, it may do so before release of the tendering document to potential Tenderers.

Change Order Procedures and Forms: Similar to the Installation and Operational Acceptance Certificates, *the* Change Estimate Proposal, Estimate Acceptance, Change Proposal, Change Order, and related Forms should be included in the tendering document unaltered. If the Procuring Entity wishes to amend the recommended procedures and/ or certificates, it may do so before release of the tendering document.

Notes to Tenderers on working with the Sample Contractual Forms

The following forms are to be completed and submitted by the successful Tenderer following notification of award: (i) Contract Agreement, with all Appendices; (ii) Performance Security; and (iii) Advance Payment Security.

Contract Agreement: In addition to specifying the parties and the Contract Price, the Contract Agreement is where the:

(i) Supplier Representative; (ii) if applicable, agreed Adjudicator and his/her compensation; and (iii) the List of Approved Subcontractors are specified. In addition, modifications to the successful Tenderer's Tender Price Schedules are attached to the Agreement. These contain corrections and adjustments to the

Supplier's tender prices to correct errors, adjust the Contract Price to reflect - if applicable - any extensions to tender validity beyond the last day of original tender validity plus 56 days, etc.

Performance Security: Pursuant to GCC Clause 13.3, the successful Tenderer is required to provide the Performance Security in the form contained in this section of these tendering documents and in the amount specified in accordance with the SCC.

Advance Payment Security: Pursuant to GCC Clause 13.2, the successful Tenderer is required to provide a bank guarantee for the full amount of the Advance Payment – if an Advance Payment is specified in the SCC for GCC Clause

12.1- in the form contained in this section of these tendering documents or another form acceptable to the Procuring Entity. If a Tenderer wishes to propose a different Advance Payment Security form, it should submit a copy to the Procuring Entity promptly for review and confirmation of acceptability before the tender submission deadline.

The Procuring Entity and Supplier will use the following additional forms during Contract implementation to formalize or certify important Contract events: (i) the Installation and Operational Acceptance Certificates; and (ii) the various Change Order forms. These and the procedures for their use during performance of the Contract are included in the tendering documents for the information of Tenderers.

1. Notification of Intention to Award

[This Notification of Intention to Award shall be sent to each Tenderer that submitted a Tender.]

[*Send this Notification to the Tenderer's Authorized Representative named in the Tenderer Information Form*]

[For the attention of Tenderer's Authorized Representative Name: ..... [insert Authorized Representative's name]

Address: ..... *[insert Authorized Representative's Address]*

Telephone/Fax numbers: ..... *[insert Authorized Representative's telephone/fax numbers]*

Email Address: ..... *[insert Authorized Representative's email address]*

[IMPORTANT: insert the date that this Notification is transmitted to all participating Tenderers. The Notification must be sent to all Tenderers simultaneously. This means on the same date and as close to the same time as possible.]

DATE OF TRANSMISSION: .....This Notification is sent by: [*email/fax*] on[*date*](local time) **Notification of Intention to Award**

[Procuring Entity]: ..... *[insert the name of the Procuring Entity]*

Project: .....*[insert name of project]*

Contract title: ..... *[insert the name of the contract]*

Country: .....*[insert country where ITT is issued]*

ITT No: ..... *[insert ITT reference number from Procurement Plan]*

This Notification of Intention to Award (Notification) notifies you of our decision to award the above contract. The transmission of this Notification begins the Standstill Period. During the Standstill Period you may:

a) Request a debriefing in relation to the evaluation of your Tender, and/ or

b) Submit a Procurement-related Complaint in relation to the decision to award the contract.

a. The successful Tenderer

Name:	[*insert name of successful Tenderer*]
Address:	[*insert address of the successful Tenderer*]
Contract price:	[*insert contract price of the successful Tenderer*]
Total combined score:	[*insert the total combined score of the successful Tenderer*]

b. Other Tenderers

[INSTRUCTIONS: insert names of all Tenderers that submitted a Tender. If the Tender's price was evaluated include the evaluated price as well as the Tender price as read out.]

Name of Tenderer	**Technical Score (If applicable)**	**Tender price**	**Evaluated Tender Cost**	**Combined Score (if applicable)**
[*insert name*]	[*insert Technical score*]	[*insert Tender price*]	[*insert evaluated cost*]	[*insert combined score*]
[*insert name*]	[*insert Technical score*]	[*insert Tender price*]	[*insert evaluated cost*]	[*insert combined score*]
[*insert name*]	[*insert Technical score*]	[*insert Tender price*]	[*insert evaluated cost*]	[*insert combined score*]
[*insert name*]	[*insert Technical score*]	[*insert Tender price*]	[*insert evaluated cost*]	[*insert combined score*]
[*insert name*]	[*insert Technical score*]	[*insert Tender price*]	[*insert evaluated cost*]	[*insert combined score*]

Reason/s why your Tender was unsuccessful [Delete if the combined score already reveals the reason]

[INSTRUCTIONS; State the reason/s why this Tenderer's Tender was unsuccessful. Do NOT include: (a) a point by point comparison with another Tenderer's Tender or (b) information that is marked confidential by the Tenderer in its Tender.]

c. How to request a debriefing

DEADLINE: The deadline to request a debriefing expires at midnight on [*insert date*] (local time).

You may request a debriefing in relation to the results of the evaluation of your Tender. If you decide to request a debriefing your written request must be made within three (3) Business Days of receipt of this Notification of Intention to Award.

Provide the contract name, reference number, name of the Tenderer, contact details; and address the request for debriefing as follows:

Attention: [*insert full name of person, if applicable*] **Title/position:** [*insert title/position*]

Agency: [*insert name of Procuring Entity*] **Email address:** [*insert email address*] **Fax number:** [*insert fax number*] *delete if not used*

If your request for a debriefing is received within the 3 Business Days deadline, we will provide the debriefing within five (5) Business Days of receipt of your request. If we are unable to provide the debriefing within this period, the Standstill Period shall be extended by five (5) Business Days after the date that the debriefing is provided. If this happens, we will notify you and confirm the date that the extended Standstill Period will end.

The debriefing may be in writing, by phone, video conference call or in person. We shall promptly advise you in writing how the debriefing will take place and

confirm the date and time.

If the deadline to request a debriefing has expired, you may still request a debriefing. In this case, we will provide the debriefing as soon as practicable, and normally no later than fifteen (15) Business Days from the date of publication of the Contract Award Notice.

d. How to make a complaint

DEADLINE: The deadline for submitting a Procurement-related Complaint challenging the decision to award the contract expires on midnight, [*insert date*] (local time).

Provide the contract name, reference number, name of the Tenderer, contact details; and address the Procurement- related Complaint as follows:

Attention: [*insert full name of person, if applicable*] **Title/position**:__[*insert title/position*]
Agency: [*insert name of Procuring Entity*] **Email address**:_____[*insert email address*]

At this point in the procurement process, you may submit a Procurement-related Complaint challenging the decision to award the contract. You do not need to have requested, or received, a debriefing before making this complaint. Your complaint must be submitted within the Standstill Period and received by us before the Standstill Period ends. Further information:

For more information refer to the Public Procurement and Disposals Act 2015 and its Regulations available from the Website info@ppra.go.ke or complaints@ppra.go.ke.

In summary, there are four essential requirements:

1. You must be an' interested party'. In this case, that means a Tenderer who submitted a Tender in this procurement, and is the recipient of a Notification of Intention to Award.
2. The complaint can only challenge the decision to award the contract.
3. You must submit the complaint within the deadline stated above.
4. You must include, in your complaint, all of the information required by the Procurement Regulations (as described in Annex III).

e. Standstill Period

DEADLINE: The Standstill Period is due to end at midnight on [*insert date*] (local time).
The Standstill Period lasts ten (10) Business Days after the date of transmission of this Notification of Intention to Award.

The Standstill Period may be extended. This may happen where we are unable to provide a debriefing within the five (5) Business Day deadline. If this happens, we will notify you of the extension.

If you have any questions regarding this Notification please do not hesitate to contact us. On behalf of the Procuring Entity:

Signature:_____ Name:____ Title/position:____Telephone:__ Email: ____

2. REQUEST FOR REVIEW

FORM FOR REVIEW (r.203(1))

PUBLIC PROCUREMENT ADMINISTRATIVE REVIEW BOARD

APPLICATION NO…….OF…….….20……...

BETWEEN

……...…….APPLICANT

AND

……RESPONDENT (Procuring Entity)

Request for review of the decision of the…… (Name of the Procuring Entity of ……dated the…day of ……20…….in the matter of Tender No……..…of ……..20….. for .....(Tender description).

REQUEST FOR REVIEW

I/We……,the above named Applicant(s), of address: Physical address……P. O. Box No……. Tel. No……..Email ……, hereby request the Public Procurement Administrative Review Board to review the whole/part of the above mentioned decision on the following grounds , namely:

1.

2.

By this memorandum, the Applicant requests the Board for an order/orders that:

1.

2.

SIGNED ……(Applicant) Dated on……day of ……/…20……

FOR OFFICIAL USE ONLY Lodged with the Secretary Public Procurement Administrative Review Board on……day of ……...20……

SIGNED

Board Secretary

2. Letter of Award

_____)_____

To: _____

This is to notify you that your Tender dated_____for execution of the _____ for the Contract Price in the aggregate of_____, as corrected and modified in accordance with the Instructions to Tenderers is here by accepted by our Agency.

You are requested to furnish the Performance Security within 28 days in accordance with the Conditions of Contract, using for that purpose one of the Performance Security Forms included in Section X, - Contract Forms, of the Tendering Document.

Authorized Signature:

_____

Name and Title of Signatory:

_____

Name of Agency:

_____

Attachment: Contract Agreement

3. Contract Agreement

THIS CONTRACT AGREEMENT is made on the ***.....[insert: ordinal]*** day of ..... ***[insert: month], [insert: year].*** BETWEEN (1) ***..... [insert: Name of Procuring Entity],*** a ***[insert: description of type of legal entity, for example, an agency of the Department of……..]*** of the Government of Kenya**,** or corporation incorporated under the laws of Kenya and having its principal place of business at ***[insert: address of Procuring Entity]*** (here in after called "the Procuring Entity"), and (2).....***[insert: name of Supplier],*** a corporation incorporated under the laws of ***[insert: country of Supplier]*** and having its principal place of business at ***[insert: address of Supplier]*** (here in after called "the Supplier").

WHEREAS the Procuring Entity desires to engage the Supplier to supply, install, achieve Operational Acceptance of, and support the following Information System ***[insert: brief*** description ***of the Information System]*** ("the System"), and the Supplier has agreed to such engagement upon and subject to the terms and conditions appearing below in this Contract Agreement.

NOW IT IS HERE BY AGREED as follows:

Article 1. Contract Documents

1.1 Contract Documents (Reference GCC Clause1.1(a) (ii))

The following documents shall constitute the Contract between the Procuring Entity and the Supplier, and each shall be read and construed as an integral part of the Contract:

a) This Contract Agreement and the Appendices attached to the Contract Agreement
b) Special Conditions of Contract
c) General Conditions of Contract
d) Technical Requirements (including Implementation Schedule)
e) The Supplier's tender and original Price Schedules
f) [Add here: any other documents]

1.2 Order of Precedence (Reference GCC Clause 2)

In the event of any ambiguity or conflict between the Contract Documents listed above, the order of precedence shall be the order in which the Contract Documents are listed in Article 1.1 (Contract Documents) above, provided that Appendix 7 shall prevail over all provisions of the Contract Agreement and the other Appendices attached to the Contract Agreement and all the

other Contract Documents listed in Article 1.1above.

1.3 Definitions (Reference GCC Clause1)
Capitalized words and phrases used in this Contract Agreement shall have the same meanings as prescribed to them in the General Conditions of Contract.

Article 2.
Contract Price and Terms of Payment

2.1 Contract Price (Reference GCC Clause 1.1(a)(viii) and GCC Clause 11) The Procuring Entity here by agrees to pay to the Supplier the Contract Price in consideration of the performance by the Supplier of its obligations under the Contract. The Contract Price shall be the aggregate of: [***insert: amount of foreign currency A in words], [insert: amount in figures],*** plus ***[insert: amount of foreign currency B in words], [insert: amount in figures],*** plus ***[insert: amount of foreign currency C in words], [insert: amount in figures], [insert: amount of local currency in words], [insert: amount in figures],*** as specified in the Grand Summary Price Schedule.

The Contract Price shall be understood to reflect the terms and conditions used in the specification of prices in the detailed price schedules, including the terms and conditions of the associated incoterms, and the taxes, duties and related levies if and as identified.

Article 3.
Effective Date for Determining Time for Operational Acceptance

3.1 Effective Date (Reference GCC Clause 1.1(e) (ix))
The time allowed for supply, installation, and achieving Operational Acceptance of the System shall be determined from the date when all of the following conditions have been fulfilled:

a) This Contract Agreement has been duly executed for and on behalf of the Procuring Entity and the Supplier;
b) The Supplier has submitted to the Procuring Entity the performance security and the advance payment security, in accordance with GCC Clause 13.2 and GCC Clause13.3;
c) The Procuring Entity has paid the Supplier the advance payment, in accordance with GCC Clause 12; Each party shall use its best efforts to fulfill the above conditions for which it is responsible as soon as

practicable.

3.2 If the conditions listed under 3.1 are not fulfilled within two (2) months from the date of this Contract Agreement because of reasons not attributable to the Supplier, the parties shall discuss and agree on an equitable adjustment to the Contract Price and the Time for Achieving Operational Acceptance and/or other relevant conditions of the Contract.

Article 4. Appendixes

4.1 The Appendixes listed below shall be deemed to form an integral part of this Contract Agreement.

4.2 Reference in the Contract to any Appendix shall mean the Appendixes listed below and attached to this Contract Agreement, and the Contract shall be read and construed accordingly.

APPENDIXES
Appendix 1. Supplier's Representative
Appendix 2. Adjudicator *[If there is no Adjudicator, state **"not applicable"**]*
Appendix 3. List of Approved Subcontractors
Appendix 4. Categories of Software
Appendix 5. Custom Materials
Appendix 6. Revised Price Schedules (if any)
Appendix 7. Minutes of Contract Finalization Discussions and Agreed-to Contract Amendments

IN WITNESS WHEREOF the Procuring Entity and the Supplier have caused this Agreement to be duly executed by their duly authorized representatives the day and year first above written.

a) For and on behalf of the Procuring Entity
Signed:

in the capacity of ***[insert: title or other appropriate designation]***
in the presence of

b) For and on behalf of the Supplier

Signed:

in the capacity of ***[insert: title or other appropriate designation]***

in the presence of_____

3. Appendices

a) Appendix 1. Supplier's Representative

In accordance with GCC Clause 1.1 (b) (iv), the Supplier's Representative is:

Name: .....*[insert: name and provide title and address further below, or state "to be nominated within fourteen (14) days of the Effective Date"]*

Title: .....*[if appropriate, insert: title]*

In accordance with GCC Clause 4.3, the Supplier's addresses for notices under the Contract are:

Address of the Supplier's Representative: .....[***as appropriate, insert: personal delivery, postal, cable, facsimile, electronic mail, and/or EDI addresses.]***

Fallback address of the Supplier: .....[***as appropriate, insert: personal delivery, postal, cable, facsimile, electronic mail, and/or EDI addresses.]***

b) Appendix

Adjudicator in accordance with GCC Clause1.1 (b) (vi), the agreed-upon Adjudicator is: Name: ..... ***[insert: name]*** Title: ..... ***[insert: title]*** Address: .....***[insert: postal address]*** Telephone: ..... ***[insert: telephone]*** in accordance with GCC Clause 43.1.3, the agreed-upon fees and reimbursable expenses are: Hourly Fees: ..... ***[insert: hourly fees]*** Reimbursable Expenses: .....***[list: reimbursables]***

Pursuant to GCC Clause 43.1.4, if at the time of Contract signing, agreement has not been reached between the Procuring Entity and the Supplier, an Adjudicator will be appointed by the Appointing Authority named in the SCC.

c) Appendix 3. List of Approved Subcontractors

The Procuring Entity has approved use of the following Subcontractors nominated by the Supplier for carrying out the item or component of the System indicated. Where more than one Subcontractor is listed, the Supplier is free to choose between them, but it must notify the Procuring Entity of its choice sufficiently in advance of the time when the subcontracted work needs to commence to give the Procuring Entity reasonable time for review. In accordance with GCC Clause 20.1, the Supplier is free to submit proposals for Subcontractors for additional items from time to time. No subcontracts shall be placed with any such Subcontractors for additional items until the Subcontractors have been approved in writing by the Procuring Entity and their names have been added to this list of Approved Subcontractors, subject to GCC Clause20.3.

[specify: item, approved Subcontractors, and their place of registration that the Supplier proposed in the corresponding attachment to its tender and that the Procuring Entity approves that the Supplier engage during the performance of the Contract. Add additional pages as necessary.]

	Approved Subcontractors	**Place of Registration**

d) Appendix 4. Categories of Software

The following table assigns each item of Software supplied and installed under the Contract to one of the three categories: (i) System Software, (ii) General-Purpose Software, or (iii) Application Software; and to one of the two categories: (i) Standard Software or (ii) Custom Software.

	(Select one per item)			**(Select one per item)**	
Software Item	**System Software**	**General-Purpose Software**	**Application Software**	**Standard Software**	**Custom Software**

e) Appendix 5. Custom Materials

The follow table specifies the Custom Materials the Supplier will provide under the Contract.

Custom Materials

f) Appendix 6. Revised Price Schedules

The attached Revised Price Schedules (if any) shall form part of this Contract Agreement and, where differences exist, shall supersede the Price Schedules contained in the Supplier's Tender. These Revised Price Schedules reflect any corrections or adjustments to the Supplier's tender price, pursuant to the ITT Clauses 30.3 and 38.2.

g) Appendix 7. Minutes of Contract Finalization Discussions and Agreed-to Contract Amendments

The attached Contract amendments (if any) shall form part of this Contract Agreement and, where differences exist, shall supersede the relevant clauses in the GCC, SCC, Technical Requirements, or other parts of this Contract as defined in GCC Clause 1.1 (a) (ii).

4. Performance and Advance Payment Security Forms

Performance Security Form (Demand Bank Guarantee)

[The bank, as requested by the successful Tenderer, shall fill in this form in accordance with the instructions indicated] [Guarantor Form head or SWIFT identifier code] .....
[insert: Bank's Name, and Address of Issuing Branch or Office]
Beneficiary: ..... *[insert: **Name and Address of Procuring Entity**]*
Date: ..... ***[**insert: **date**]*
PERFORMANCE GUARANTEE No.: ..... ***[**insert: **Performance Guarantee Number**]* **Guarantor: .....** *[Insert name and address of place of issue, unless indicated in the Form head.]*

We have been informed that on *[insert: **date of award**]* you awarded Contract No. *[insert: **Contract number**]* for *[insert: **title and/or brief description of the Contract**]* (hereinafter called "the Contract") to *[insert: **complete name of Supplier which in the case of a joint venture shall be in the name of the joint venture**]* (hereinafter called "the Applicant"). Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Applicant, we as Guarantor here by irrevocably undertake to pay you any sum(s) not exceeding *[insert: **amount(s)[1] in figures and words**]* such sum being payable in the types and proportions of currencies which the Contract Price is payable upon receipt by us of the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating that the Applicant is in breach of its obligation(s) under the contract without the Beneficiary needing to prove or to showgrounds or reasons for their demand or the sum specified there in.

On the date of your issuing, to the Supplier, the Operational Acceptance Certificate for the System, the value of this guarantee will be reduced to any sum(s) not exceeding..... *[insert: **amount(s) 4 in figures and words**]*. This remaining guarantee shall expire no later than.....*[insert: **number** and select: **of months/of years** (of the Warranty Period that needs to be covered by the remaining guarantee)]* from the date of the Operational Acceptance Certificate for the System[2], and any demand

for payment under it must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees, (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under 15 (a) is hereby excluded.

_____

[Signature(s)]

Note: All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.

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[1] *The bank shall insert the amount(s) specified and denominated in the SCC for GCC Clauses 13.3.1 and 13.3.4 respectively, either in the currency(ies) of the Contract or a freely convertible currency acceptable to the Procuring Entity.*

[2] *In this sample form, the formulation of this paragraph reflects the usual SCC provisions for GCC Clause 13.3. However, if the SCC for GCC Clauses 13.3.1 and*
13.3.4 varies from the usual provisions, the paragraph, and possibly the previous paragraph, need to be adjusted to precisely reflect the provisions specified in the SCC.

5. Advance Payment Security

Demand Bank Guarantee

[Guarantor Form head or SWIFT identifier code]

Beneficiary: ..... *[insert: **Name and Address of Procuring Entity**]*

Date: ..... *[**insert date of issue**]*

ADVANCE PAYMENT GUARANTEE No.: ..... [*insert: **Advance Payment Guarantee Number**]*

Guarantor: ..... *[Insert name and address of place of issue, unless indicated in the Form head]*

We have been informed that on.....*[insert: **date of award**]* you awarded Contract No. *[insert: **Contract number**]* for .....*[insert: **title and/or brief description of the Contract**]* (here in after called "the Contract") to *[insert: **complete name of Supplier, which in the case of a joint venture shall be the name of the joint venture**]* (here in after called" the Applicant").

Furthermore, we understand that, according to the conditions of the Contract, an advance payment in the sum of ***[insert: amount in numbers and words, for each currency of the advance payment]*** is to be made to the Supplier against an advance payment guarantee.

At the request of the Applicant, we as Guarantor, here by irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of..... *[Insert amount in figures]* ( ) *[insert amount in words]*[1] upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating either that the Applicant:

(a) Has used the advance payment for purposes other than toward delivery of Goods; or

(b) has failed to repay the advance payment in accordance with the Contract conditions, specifying the amount which the Applicant has failed to repay.

A demand under this guarantee may be presented as from the presentation to the Guarantor of a certificate from the Beneficiary's bank stating that the advance payment referred to above has been credited to the Applicant on its account number.....*[insert number]*at.....*[insert name and address of Applicant's bank]*.

The maximum amount of this guarantee shall be progressively reduced by the amount of the advance payment repaid by the Applicant as specified in copies of interim statements or payment certificates which shall be presented to us. This guarantee shall expire, at the latest, upon our receipt of a copy of the interim payment certificate indicating that ninety
(90) percent of the Accepted Contract Amount, has been certified for payment, or on the.....*[insert day]* day of.....*[insert month]*, 2 *[insert year]*, whichever is earlier. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No.758, except that the supporting statement under Article 15(a) is hereby excluded.

[signature(s)]

Note: All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.

6. Installation and Acceptance Certificates (insert format)

Installation Certificate

Date: ..... ***[insert: date]***

ITT: ..... ***[insert: title and number of ITT]***

Contract: ..... ***[insert: name and number of Contract]***

To: ..... ***[insert: name and address of Supplier]***

Dear Sir or Madam:

Pursuant to GCC Clause 26 (Installation of the System) of the Contract entered into between yourselves and the..... ***[insert: name of Procuring Entity]*** (hereinafter the "Procuring Entity") dated..... ***[insert: date of Contract],*** relating to the.....***[insert: brief description of the Information System],*** we hereby notify you that the System (or a Subsystem or major component thereof) was deemed to have been correctly installed on the date specified below.

1. Description of the System (or relevant Subsystem or major component: ..... ***[insert: description]***

2. Date of Installation:
..... ***[insert: date]***

Notwithstanding the above, you are required to complete the outstanding items listed in the attachment to this certificate as soon as practicable. This Form shall not relieve you of your obligation to achieve Operational Acceptance of the

System in accordance with the Contract nor of your obligations during the Warranty Period.

For and on behalf of the Procuring Entity

Signed: .....

Date: .....

in the capacity of: .....

[*state: "Project Manager" or* state the title of a higher-level authority in the Procuring Entity's organization]

7. Operational Acceptance Certificate

Date: .....*[insert: date]*

ITT: .....*[insert: title and number of ITT]*

Contract: .....*[insert: name of System or Subsystem and number of Contract]*

To: .....*[insert: name and address of Supplier]*

Dear Sir or Madam:

Pursuant to GCC Clause 27 (Commissioning and Operational Acceptance) of the Contract entered into between yourselves and the.....***[insert: name of Procuring Entity]*** (hereinafter the "Procuring Entity") dated..... ***[insert: date of Contract],*** relating to the.....***[insert: brief description of the Information System],*** we hereby notify you the System (or the Subsystem or major component identified below) successfully completed the Operational Acceptance Tests specified in the Contract. In accordance with the terms of the Contract, the Procuring Entity here by takes over the System (or the Subsystem or major component identified below), together with the responsibility for care and custody and the risk of loss thereof on the date mentioned below.

1. Description of the System (or Subsystem or major component): .....[***insert: description]***
2. Date of Operational Acceptance: .....[***insert: date]***

   This Form shall not relieve you of your remaining performance obligations under the Contract nor of your obligations during the Warranty Period.

For and on behalf of the Procuring Entity

Signed: .....

Date: .....

in the capacity of: .....***[state: "Project Manager" or higher-level authority in the Procuring Entity's organization]***

8. Change Order Procedures and Forms

Date: .....*[insert: date]*

ITT: .....*[insert: title and number of ITT]*

Contract: .....*[insert: name or System or Subsystem and number of Contract]*

General

This section provides samples of procedures and forms for carrying out changes to the System during the performance of the Contract in accordance with GCC Clause 39 (Changes to the System) of the Contract.

Change Order Log

The Supplier shall keep an up-to-date Change Order Log to show the current status of Requests for Change and Change Orders authorized or pending. Changes shall be entered regularly in the Change Order Log to ensure that the log is kept up-to-date. The Supplier shall attach a copy of the current Change Order Log in the monthly progress report to be submitted to the Procuring Entity.

References to Changes

1) Request for Change Proposals (including Application for Change Proposals) shall be serially numbered CR-nnn.
2) Change Estimate Proposals shall be numbered CN-nnn.
3) Estimate Acceptances shall be numbered CA-nnn.
4) Change Proposals shall be numbered CP-nnn.
5) Change Orders shall be numbered CO-nnn. On all forms, the numbering shall be determined by the original CR-nnn.

Annexes

8.1 Request for Change Proposal Form

8.2 Change Estimate Proposal Form

8.3 Estimate Acceptance Form

8.4 Change Proposal Form

8.5 Change Order Form

8.6 Application for Change Proposal Form

8.1 Request for Change Proposal Form

(Procuring Entity's Form head)

Date: .....*[insert: date]*

ITT: .....*[insert: title and number of ITT]*

Contract: .....*[insert: name of System or Subsystem or number of Contract]*

To: .....*[insert: name of Supplier and address]*

Attention: .....*[insert: name and title]*

Dear Sir or Madam:

With reference to the above-referenced Contract, you are requested to prepare and submit a Change Proposal for the Change noted below in accordance with the following instructions within ***[insert: number]*** days of the date of this Form.

1. Title of Change: [***insert: title]***
2. Request for Change No./Rev.: [***insert: number]***
3. *Originator of Change:* [select Procuring Entity / Supplier (by Application for Change Proposal), and add: name of originator]
4. Brief Description of Change: ***[insert: description]***
5. System (or Subsystem or major component affected by requested Change): [***insert: description]***
6. Technical documents and/ or drawings for the request of Change: Document or Drawing No. Description
7. Detailed conditions or special requirements of the requested Change: [***insert: description]***
8. Procedures to be followed:
   a) Your Change Proposal will have to show what effect the requested Change will have on the Contract Price.
   b) Your Change Proposal shall explain the time it will take to complete the requested Change and the impact, if any, it will have on the date when Operational Acceptance of the entire System agreed in the Contract.
   c) If you believe implementation of the requested Change will have a negative impact on the quality, operability, or integrity of the System, please provide a detailed explanation, including other approaches that might achieve the same impact as the requested Change.

d) You should also indicate what impact the Change will have on the number and mix of staff needed by the Supplier to perform the Contract.
e) You shall not proceed with the execution of work related to the requested Change until we have accepted and confirmed the impact it will have on the Contract Price and the Implementation Schedule in writing.

9. As next step, please respond using the Change Estimate Proposal form, indicating how much it will cost you to prepare a concrete Change Proposal that will describe the proposed approach for implementing the Change, all it's elements, and will also address the points in paragraph 8 above pursuant to GCC Clause 39.2.1. Your Change Estimate Proposal should contain a first approximation of the proposed approach, and implications for schedule and cost, of the Change.

For and on behalf of the Procuring Entity

Signed: .....

Date: .....

in the capacity of: .....[***state: "Project Manager" or higher-level authority in the Procuring Entity's organization]***

8.2 Change Estimate Proposal Form

(Supplier's Form head)

Date: .....*[insert: date]*

ITT: .....*[insert: title and number of ITT]*

Contract: .....*[insert: name of System or Subsystem and number of Contract]*

To: .....*[insert: name of Procuring Entity and address]*

Attention: ..... *[insert: name and title]*

Dear Sir or Madam:

With reference to your Request for Change Proposal, we are pleased to notify you of the approximate cost of preparing the below-referenced Change in accordance with GCC Clause 39.2.1 of the Contract. We acknowledge that your agreement to the cost of preparing the Change Proposal, in accordance with GCC Clause 39.2.2, is required before we proceed to prepare the actual Change Proposal including a detailed estimate of the cost of implementing the Change itself.

1. Title of Change: .....*[insert: title]*
2. Request for Change No./Rev.: .....*[insert: number]*
3. Brief Description of Change (including proposed implementation approach): .....*[insert: description]*
4. Schedule Impact of Change (initial estimate): .....*[insert: description]*
5. Initial Cost Estimate for Implementing the Change: .....*[insert: initial cost estimate]*
6. Cost for Preparation of Change Proposal*:* .....*[insert: cost in the currencies of the Contract],* as detailed below in the breakdown of prices, rates, and quantities.

For and on behalf of the Supplier Signed:

.....

Date: .....

in the capacity of: .....*[state: "Supplier's Representative" or other higher-level authority in the Supplier's organization]*

8.3 Estimate Acceptance Form

(Procuring Entity's Form head) Date: .....*[insert: date]*

ITT.....*[insert: title and number of ITT]*
Contract: .....*[insert: name of System or Subsystem and number of Contract]*

To: .....*[insert: name of Supplier and address]* Attention: .....*[insert: name and title]* Dear Sir or Madam:
We hereby accept your Change Estimate and agree that you should proceed with the preparation of a formal Change Proposal.

1. Title of Change: *[insert: title]*
2. Request for Change No./ Rev.: *[insert: request number /revision]*
3. Change Estimate Proposal No./ Rev.: *[insert: proposal number/ revision]*
4. Estimate Acceptance No./ Rev.: *[insert: estimate number/ revision]*
5. Brief Description of Change: *[insert: description]*
6. Other Terms and Conditions:

In the event that we decide not to order the Change referenced above, you shall be entitled to compensation for the cost of preparing the Change Proposal up to the amount estimated for this purpose in the Change Estimate Proposal, in accordance with GCC Clause 39 of the General Conditions of Contract.

For and on behalf of the Procuring Entity

Signed: .....

Date: .....

in the capacity of: .....*[state: "Project Manager" or higher-level authority in the Procuring Entity's organization]*

8.4 Change Proposal Form

(Supplier's Form head)
Date: .....*[insert: date]*
ITT: .....*[insert: title and number of ITT]*
Contract: .....*[insert: name of System or Subsystem and number of Contract]*

To: .....*[insert: name of Procuring Entity and address]*

Attention: .....***[insert: name and title]***

Dear Sir or Madam:
In response to your Request for Change Proposal No. *[insert: number]*, we here by submit our proposal as follows:

1. Title of Change: *[insert: name]*

2. Change Proposal No./ Rev.: *[insert: proposal number /revision]*

3. Origin at or of Change: *[select: Procuring Entity /Supplier; and add: name]*

4. Brief Description of Change: *[insert: description]*

5. Reasons for Change: *[insert: reason]*

6. The System Subsystem, major component, or equipment that will be affected by the requested Change: *[insert: description]*

7. Technical documents and/ or drawings for the requested Change:
   Document or Drawing No. Description

8. Estimate of the increase/ decrease to the Contract Price resulting from the proposed Change: *[insert: amount in currencies of Contract]*, as detailed below in the breakdown of prices, rates, and quantities. Total lump sum cost of the Change:

   Cost to prepare this Change Proposal (i. e., the amount payable if the Change is not accepted, limited as provided by GCC Clause 39.2.6):

9. Additional Time for Achieving Operational Acceptance required due to the Change: *[insert: amount in days/ weeks]*

10. Effect on the Functional Guarantees: *[insert: description]*

11. Effect on the other terms and conditions of the Contract: ***[insert: description]***

12. Validity of this Proposal: for a period of .....*[insert: number]* days after receipt of this Proposal by the Procuring Entity

13. Procedures to be followed:
    a) You are requested to notify us of your acceptance, comments, or rejection of this detailed Change Proposal within.....*[insert: number]* days from your receipt of this Proposal.
    b) The amount of any increase and / or decrease shall be taken into account in the adjustment of the Contract Price.

For and on behalf of the Supplier

Signed: .....

Date: .....

in the capacity of: …… *[state: "Supplier's Representative" or other higher-level authority in the Supplier's organization]*

8.5 Change Order Form

(Procuring Entity's Form head)

Date: .....***[insert: date]***

ITT: .....***[insert: title and number of ITT]***

Contract: .....***[insert: name of System or Subsystem and number of Contract]***

To: .....***[insert: name of Supplier and address]***

Attention: .....***[insert: name and title]***

Dear Sir or Madam:

We hereby approve the Change Order for the work specified in Change Proposal No. ***[insert: number***], and agree to adjust the Contract Price, Time for Completion, and/ or other conditions of the Contract in accordance with GCC Clause 39 of the Contract.

1. Title of Change: [***insert: name]***

2. Request for Change No./ Rev.: [***insert: request number/ revision]***

3. Change Order No./ Rev.: [***insert: order number/ revision]***

4. Origin at or of Change: [***select: Procuring Entity / Supplier; and add: name]***

5. Authorized Price for the Change: Ref. No.: ***[insert: number]*** Date: ***[insert: date]***

[insert: amount in foreign currency A] plus [insert: amount in foreign currency B] plus [insert: amount in foreign currency C] plus [insert: amount in local currency]

6. Adjustment of Time for Achieving Operational Acceptance: ***[insert: amount and description of adjustment]***

7. Other effects, if any: ***[state: "none" or insert description]***

For and on behalf of the Procuring Entity

Signed: .....
Date: .....

in the capacity of: .....***[state: "Project Manager" or higher-level authority in the Procuring Entity's organization]***
For and on behalf of the Supplier
Signed: .....

Date: .....

in the capacity of: .....[***state "Supplier's Representative" or higher-level authority in the Supplier's organization]***

8.6 Application for Change Proposal Form

(Supplier's Form head)

Date: .....*[insert: date]*

ITT: .....*[insert: title and number of ITT]*

Contract: .....*[insert: name of System or Subsystem and number of Contract]*

To: .....*[insert: name of Procuring Entity and address]*

Attention: .....*[insert: name and title]*

Dear Sir or Madam:

We hereby propose that the below-mentioned work be treated as a Change to the System.

1. Title of Change: .....*[insert: name]*
2. Application for Change Proposal No./ Rev.: .....*[insert: number/ revision]* dated: [*insert: date]*
3. Brief Description of Change: .....*[insert: description]*
4. Reasons for Change: .....*[insert: description]*
5. Order of Magnitude Estimation: .....*[insert: amount in currencies of the Contract]*
6. Schedule Impact of Change: .....*[insert: description]*
7. Effect on Functional Guarantees, if any: .....*[insert: description]*
8. Appendix: .....*[insert: titles (if any); otherwise state "none"]*

For and on behalf of the Supplier

Signed: .....

Date: .....

in the capacity of: .....*[state: "Supplier's Representative" or higher-level authority in the Supplier's organization]*

9. BENEFICIAL OWNERSHIP DISCLOSURE FORM

INSTRUCTIONS TO TENDERERS: DELETE THIS BOX ONCE YOU HAVE COMPLETED THE FORM

This Beneficial Ownership Disclosure Form ("Form") is to be completed by the successful tenderer. In case of joint venture, the tenderer must submit a separate Form for each member. The beneficial ownership information to be submitted in this Form shall be current as of the date of its submission.

For the purposes of this Form, a Beneficial Owner of a Tenderer is any natural person who ultimately owns or controls the Tenderer by meeting one or more of the following conditions:

- *Directly or indirectly holding 25% or more of the shares.*
- *Directly or in directly holding 25% or more of the voting rights.*
- *Directly or indirectly having the right to appoint a majority of the board of directors or equivalent governing body of the Tenderer.*

Tender Reference No.:_____[*insert identification no*] Name of the Assignment:_____*[insert name of the assignment]* to:_____*[insert complete name of Procuring Entity]*

In response to your notification of award dated_____*[insert date of notification of award]* to furnish additional information on beneficial ownership:_*[select one option as applicable and delete the options that are not applicable]*

I) We here by provide the following beneficial ownership information.

Details of beneficial ownership

Identity of Beneficial Owner	**Directly or indirectly holding 25% or more of the shares (Yes / No)**	**Directly or indirectly holding 25 % or more of the Voting Rights (Yes / No)**	**Directly or indirectly having the right to appoint a majority of the board of the directors or an equivalent governing body of the Tenderer (Yes / No)**
[include full name (last, middle, first), nationality, country of residence]			

OR

We declare that there is no Beneficial Owner meeting one or more of the following conditions: directly or indirectly holding 25% or more of the shares. Directly or indirectly holding 25% or more of the voting rights. Directly or indirectly having the right to appoint a majority of the board of directors or equivalent governing body of the Tenderer.

OR

We declare that we are unable to identify any Beneficial Owner meeting one or more of the following conditions. [If this option is selected, the Tenderer shall provide explanation on why it is unable to identify any Beneficial Owner]

Directly or indirectly holding 25% or more of the shares. Directly or indirectly holding25% or more of the voting rights.

Directly or indirectly having the right to appoint a majority of the board of directors or equivalent governing body of the Tenderer]"

Name of the Tenderer: .....[insert complete name of the Tenderer]*

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*Name of the person duly authorized to sign the Tender on behalf of the Tenderer: ** [insert complete name of person duly authorized to sign the Tender]*

Title of the person signing the Tender: ..... [insert complete title of the person signing the Tender]

Signature of the person named above: ..... [insert signature of person whose name and capacity are shown above]

Date signed ..... [insert date of signing] day of..... [Insert month], [insert year]