



DESCRIPTION OF THE WORKS: FOR THE PROVISION OF DESIGN, ENGINEERING, SUPPLY, PROCUREMENT, FABRICATION, SOFTWARE DEVELOPMENT, TESTING, INSTALLATION, COMMISSIONING AND HANDOVER OF PROCESS CONTROL, INTEGRATED CUSTODY METERING AND PIPELINE MONITORING SYSTEMS TO ALL TRANSNET PIPELINES INLAND STATIONS, MASTER AND SECONDARY CONTROL CENTERS – **MAIN AUTOMATION CONTRACT.**

TRANSNET PIPELINES

an Operating Division **TRANSNET SOC LTD**

[hereinafter referred to as **Transnet**]

[Registration Number 1990/000900/30]

REQUEST FOR PROPOSAL (RFP)

FOR THE PROVISION OF DESIGN, ENGINEERING, SUPPLY, PROCUREMENT, FABRICATION, SOFTWARE DEVELOPMENT, TESTING, INSTALLATION, COMMISSIONING AND HANDOVER OF PROCESS CONTROL, INTEGRATED CUSTODY METERING AND PIPELINE MONITORING SYSTEMS TO ALL TRANSNET PIPELINES INLAND STATIONS, MASTER AND SECONDARY CONTROL CENTRES, FOR A PERIOD OF SIX (6) YEARS.

RFP NUMBER	: TPL/2024/06/0005/68787/RFP
ISSUE DATE	: 5th SEPTEMBER 2024
TENDER CLARIFICATION MEETING	: 17th SEPTEMBER 2024 @ 10:00AM
CLOSING DATE	: 07th OCTOBER 2024
CLOSING TIME	: 14H00
TENDER VALIDITY PERIOD	: 180 days after closing date

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T1.1 TENDER NOTICE AND INVITATION TO TENDER

SECTION 1: NOTICE TO TENDERERS

1. INVITATION TO TENDER

Responses to this Tender [hereinafter referred to as a **Tender**] are requested from persons, companies, close corporations or enterprises [hereinafter referred to as a Tenderer].

DESCRIPTION	the provision of design, engineering, supply, procurement, fabrication, software development, testing, installation, commissioning and handover of Process Control, Integrated Custody Metering and Pipeline Monitoring Systems to all Inland Stations, Master, and Secondary Control Centers – Main Automation Contract.
TENDER DOWNLOADING	This Tender may be downloaded directly from the National Treasury eTender Publication Portal at www.etenders.gov.za FREE OF CHARGE and the Transnet website at https://transnetetenders.azurewebsites.net (please use Google Chrome to access Transnet link) FREE.
TENDER CLARIFICATION MEETING WITH SITE VISIT	A Tender Clarification Meeting will be conducted at Transnet Pipelines Alrode Depot, located at 35 Garfield Street, Alberton, Gauteng (Address) on the 17TH September 2024, at 10:00am for a period of ± 3 (three) hours. [Tenderers to provide own transportation and accommodation]. The Tender Clarification Meeting will start punctually and information will not be repeated for the benefit of Tenderers arriving late. Certificate of Attendance in the form set out in the Returnable Schedule T2.2-07 hereto must be completed and submitted with your Tender, as proof of attendance. Tenderers are required to bring this Returnable Schedule T2.2-07 to the Tender Clarification Meeting to be signed by the <i>Employer's</i> Representative.
CLOSING DATE	14:00 on Monday 07th October 2024 Tenders must ensure that tenders are uploaded timeously onto the system. If a tender is late, it will not be accepted for consideration.



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2. TENDER SUBMISSION

Transnet has implemented a new electronic tender submission system, the e-Tender Submission Portal, in line with the overall Transnet digitalization strategy where suppliers can view advertised tenders, register their information, log their intent to respond to bids and upload their bid proposals/responses on to the system.

a) The Transnet e-Tender Submission Portal can be accessed as follows:

Log on to the Transnet eTenders management platform website
(<https://transnetetenders.azurewebsites.net>);

- Click on "ADVERTISED TENDERS" to view advertised tenders;
- Click on "SIGN IN/REGISTER – for bidder to register their information (must fill in all mandatory information);
- Click on "SIGN IN/REGISTER" - to sign in if already registered;
- Toggle (click to switch) the "Log an Intent" button to submit a bid;
- Submit bid documents by uploading them into the system against each tender selected.
- **Tenderers are required to ensure that electronic bid submissions are done at least a day before the closing date to prevent issues which they may encounter due to their internet speed, bandwidth or the size of the number of uploads they are submitting. Transnet will not be held liable for any challenges experienced by bidders as a result of the technical challenges. Please do not wait for the last hour to submit. A Tenderer can upload 30mb per upload and multiple uploads are permitted.**

b) The tender offers to this tender will be opened as soon as possible after the closing date and time. Transnet shall not, at the opening of tenders, disclose to any other company any confidential details pertaining to the Tender Offers / information received, i.e. pricing, delivery, etc. The names and locations of the Tenderers will be divulged to other Tenderers upon request.

c) Submissions must not contain documents relating to any Tender other than that shown on the submission.



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3. CONFIDENTIALITY

All information related to this RFP is to be treated with strict confidentiality. In this regard, Tenderers are required to certify that they have acquainted themselves with the Non-Disclosure Agreement. All information related to a subsequent contract, both during and after completion thereof, will be treated with strict confidence. Should the need however arise to divulge any information gleaned from provision of the Works, which is either directly or indirectly related to Transnet's business, written approval to divulge such information must be obtained from Transnet.

4. DISCLAIMERS

Tenderers are hereby advised that Transnet is not committed to any course of action as a result of its issuance of this Tender and/or its receipt of a tender offer. In particular, please note that Transnet reserves the right to:

- 4.1. Award the business to the highest scoring Tenderer/s unless objective criteria justify the award to another tenderer.
- 4.2. Not necessarily accept the lowest priced tender or an alternative Tender;
- 4.3. Go to the open market if the quoted rates (for award of work) are deemed unreasonable;
- 4.4. Should the Tenderers be awarded business on strength of information furnished by the Tenderer, which after conclusion of the contract is proved to have been incorrect, Transnet reserves the right to terminate the contract;
- 4.5. Request audited financial statements or other documentation for the purposes of a due diligence exercise;
- 4.6. Not accept any changes or purported changes by the Tenderer to the tender rates after the closing date;
- 4.7. Verify any information supplied by a Tenderer by submitting a tender, the Tenderer/s hereby irrevocably grant the necessary consent to the Transnet to do so;
- 4.8. Conduct the evaluation process in parallel. The evaluation of Tenderers at any given stage must therefore not be interpreted to mean that Tenderers have necessarily passed any previous stage(s);



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- 4.9. Unless otherwise expressly stated, each tender lodged in response to the invitation to tender shall be deemed to be an offer by the Tenderer. The Employer has the right in its sole and unfettered discretion not to accept any offer.
- 4.10. Not be held liable if tenderers do not provide the correct contact details during the clarification session and do not receive the latest information regarding this RFP with the possible consequence of being disadvantaged or disqualified as a result thereof.
- 4.11. Transnet reserves the right to exclude any Tenderers from the tender process who has been convicted of a serious breach of law during the preceding 5 [five] years including but not limited to breaches of the Competition Act 89 of 1998, as amended. Tenderers are required to indicate in tender returnable [T2.2-17], [Breach of Law] whether or not they have been found guilty of a serious breach of law during the past 5 [five] years.
- 4.12. Transnet reserves the right to perform a risk analysis on the preferred tenderer to ascertain if any of the following might present an unacceptable commercial risk to the employer:
- *unduly high or unduly low tendered rates or amounts in the tender offer;*
 - *contract data of contract provided by the tenderer; or*
 - *the contents of the tender returnables which are to be included in the contract.*
5. Transnet will not reimburse any Tenderer for any preparatory costs or other work performed in connection with this Tender, whether or not the Tenderer is awarded a contract.

6. NATIONAL TREASURY'S CENTRAL SUPPLIER DATABASE

Tenderer are required to self-register on National Treasury's Central Supplier Database (CSD) which has been established to centrally administer supplier information for all organs of state and facilitate the verification of certain key supplier information. The CSD can be accessed at <https://secure.csd.gov.za/>. Tenderer are required to provide the following to Transnet in order to enable it to verify information on the CSD:

Supplier Number..... and Unique registration reference
number..... (Tender Data)



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**Transnet urges its clients, suppliers and the general public
to report any fraud or corruption to
TIP-OFFS ANONYMOUS: 0800 003 056 OR Transnet@tip-offs.com**

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T1.2 TENDER DATA

The conditions of tender are the Standard Conditions of Tender as contained in Annex C of the CIDB Standard for Uniformity in Engineering and Construction Works Contracts. The Standard for Uniformity in Construction Procurement was first published in Board Notice 62 of 2004 in Government Gazette No 26427 of 9 June 2004. It was subsequently amended in Board Notice 67 of 2005 in Government Gazette No 28127 of 14 October 2005, Board Notice 93 of 2006 in Government Gazette No 29138 of 18 August 2006, Board Notice No 9 of 2008 in Government Gazette No 31823 of 30 January 2009, Board Notice 86 of 2010 in Government Gazette No 33239 of 28 May 2010, Board Notice 136 of 2015 in Government Gazette 38960 of 10 July 2015 and Board Notice 423 of 2019 in Government Gazette No 42622 of 8 August 2019.

This edition incorporates the amendments made in Board Notice 423 of 2019 in Government Gazette 42622 of 8 August 2019. (see www.cidb.org.za).

The Standard Conditions of Tender make several references to Tender data for detail that apply specifically to this tender. The Tender Data shall have precedence in the interpretation of any ambiguity or inconsistency between it and the Standard Conditions of Tender.

Each item of data given below is cross-referenced in the left-hand column to the clause in the Standard Conditions of Tender to which it mainly applies.

Clause	Data
C.1.1 The <i>Employer</i> is	Transnet SOC Ltd (Reg No. 1990/000900/30)
C.1.2 The tender documents issued by the <i>Employer</i> comprise:	
Part T: The Tender	
Part T1: Tendering procedures	T1.1 Tender notice and invitation to tender T1.2 Tender data
Part T2: Returnable documents	T2.1 List of returnable documents T2.2 Returnable schedules
Part C: The contract	
Part C1: Agreements and contract data	C1.1 Form of offer and acceptance C1.2 Contract data (Part 1 & 2)
Part C2: Pricing data	C2.1 Pricing instructions C2.2 Activity Schedule

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Part C3: Scope of work		C3.1 Works Information
C.1.4	The Employer's agent is:	Strategic Sourcing Specialist
	Name:	Nomcebo Ngcobo
	Address:	202 Anton Lembede Street (Smith) Durban, 4001
	Tel No.	031 361 1237
	E – mail	Nomcebo.Ngcobo@transnet.net

C.2.1 Only those tenderers who satisfy the following **Step 2: Prequalification eligibility criteria** are eligible to submit tenders:

1. Stage One - Eligibility with regards to attendance at the compulsory clarification meeting:

An authorised representative of the tendering entity or a representative of a tendering entity that intends to form a Joint Venture (JV) must attend the compulsory clarification meeting in terms C2.7

2. Stage 2 - Eligibility with regards to the following Pre-Qualification criteria: Proof of completion of the OEM certified courses (course certificates)
Key Personnel: Senior Control Engineer - SCADA has completed the relevant intermediate, and advanced level process control system specialist courses (OEM certified) for either AVEVA OASyS DNA or AVEVA Enterprise SCADA Systems, as listed in the Works Information Section 6.3.3.

Eligibility Schedule in the form set out in the **Returnable Schedule T2.2-01**
Proof of completion of the OEM certified courses (course certificates) for the key personnel hereto must be submitted with your Tender as proof.

Tenderers failing to submit proof of completion of the OEM certified courses will be disqualified, and the tender not evaluated further.

Note: Key Personnel put forward must be in the employ of the Company, Partnership, Joint Venture or Sole Proprietor submitting the bid.

3. Step Three – Technical Evaluation

Only those tenderers who obtain the minimum qualifying score for Technical Evaluation will be evaluated further in terms of price and the applicable preference point system.

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The minimum qualifying for score for Technical Evaluation is a Total score of 70 points. The evaluation criteria for measuring Technical Evaluation and the points for each criterion and, if any, each sub-criterion are as stated in C.3.11.4 below.

Tenderers are to note that Key Personnel in the employ of a sub-contractor and sub-contractor Company Experience will not be evaluated or count towards the Technical Evaluation score for categories T2.2.02 and T2.2.03. For Key Personnel and Company Experience to be evaluated, the Key Personnel put forward must be in the employ of, and the Company Experience presented must relate to, the Company, Partnership, Joint Venture or Sole Proprietor submitting the bid.

Any tenderer that fails to meet the stipulated qualifying criteria will be regarded as an unacceptable tender.

C.2.7 The arrangements for a tender clarification meeting are as stated in the Tender Notice and Invitation to Tender. **Tenderers must complete and sign the attendance register.** Addenda will be issued to and tenders will only be received from those tendering entities, including those entities that intends forming a joint venture, appearing on the attendance register.

Tenderers are also **required to submit their RFP document to the briefing session and have their returnable document T2.2-07 certificate of attendance** signed off by the Employer's authorised representative.

C.2.12 No alternative tender offers will be considered.

C.2.13.3 Each tender offer shall be in the **English Language.**

C.2.13.5 The *Employer's* details and identification details that are to be shown on each tender offer are as follows:

Identification details:

The tender documents must be uploaded with:

- Name of Tenderer:
- Contact person and details:
- The Tender Number:
TPL/2024/06/0005/68787/RFP
- The Tender Description: **FOR THE PROVISION OF DESIGN, ENGINEERING, SUPPLY, PROCUREMENT, FABRICATION, SOFTWARE DEVELOPMENT, TESTING, INSTALLATION, COMMISSIONING AND HANDOVER OF PROCESS CONTROL, INTEGRATED CUSTODY METERING AND PIPELINE MONITORING SYSTEMS TO ALL TRANSNET PIPELINES**

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**INLAND STATIONS, MASTER AND
SECONDARY CONTROL CENTRES, FOR A
PERIOD OF SIX (6) YEARS**

Documents must be marked for the attention of:

Employer's Agent: Nomcebo Ngcobo (Procurement Officer)

C.2.13.9 Telephonic, telegraphic, facsimile or e-mailed tender offers will not be accepted.

C.2.15 The closing time for submission of tender offers is:
Time: **14:00 on Monday, the 07th October 2024**
Location: The Transnet e-Tender Submission Portal:
(<https://transnetetenders.azurewebsites.net>);

NO LATE TENDERS WILL BE ACCEPTED

C.2.16 The tender offer validity period is **180 days** after the closing date. Tenderers are to note that they may be requested to extend the validity period of their tender, on the same terms and conditions, if Transnet's internal evaluation and governance approval processes has not been finalised within the validity period.

C.2.23 The tenderer is required to submit with his tender:

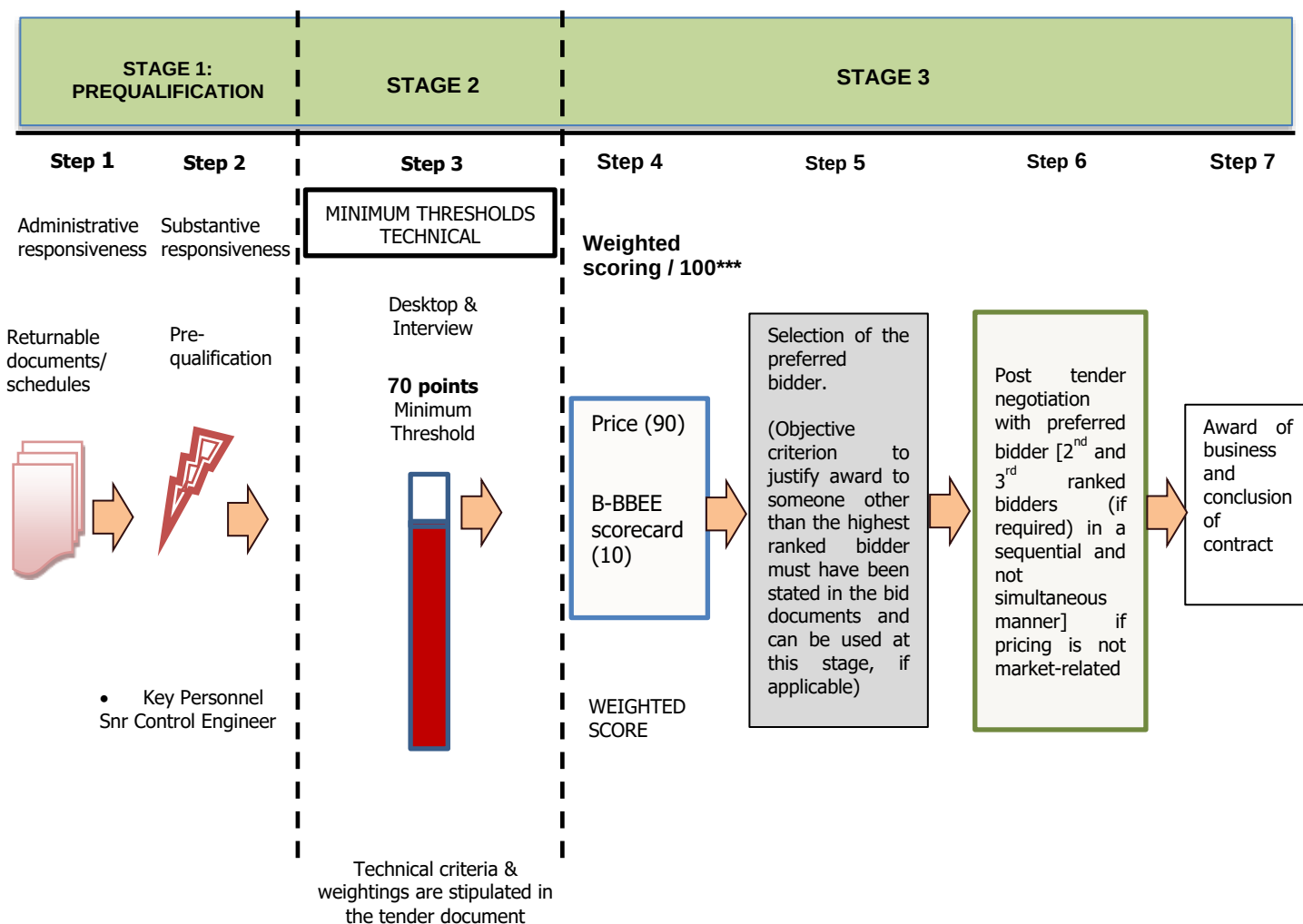
1. **Tenderers to provide Transnet with a TCS PIN to verify Tenderers SARS Tax compliance status.**
2. A valid B-BBEE Certificate from a Verification Agency accredited by the South African Accreditation System [SANAS], or a sworn affidavit confirming annual turnover and level of black ownership, in line with the code of good practice, together with the tender;
3. Proof of registration on the Central Supplier Database;
4. Letter of Good Standing with the Workmen's compensation fund by the tendering entity or separate Letters of Good Standing from all members of a newly constituted JV.

Note: Refer to Section T2.1 for List of Returnable Documents

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C3.11.1 **EVALUATION METHODOLOGY AND CRITERIA**

Transnet intends utilizing the following methodology and criteria in evaluating Tenders:



NB: Evaluation of the various stages will normally take place in a sequential manner. However, in order to expedite the process, Transnet reserves the right to conduct the different stages of the evaluation process in parallel. In such instances the evaluation of bidders at any given stage must not be interpreted to mean that bidders have necessarily passed any previous stage(s).

C3.11.2 **STEP ONE: Test for Administrative Responsiveness**

The test for administrative responsiveness will include the following:

Administrative responsiveness check
- Whether the Bid has been lodged on time - Whether all Returnable Documents and/or schedules [where applicable] were completed and returned by the closing date and time

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- | |
|--|
| <ul style="list-style-type: none">• Verify the validity of all returnable documents |
| <ul style="list-style-type: none">• Verify if the Bid document has been duly signed by the authorised respondent |

The test for administrative responsiveness [Step One] must be passed for a Respondent's Proposal to progress to Step Two for further pre-qualification.

C3.11.3 **STEP TWO: Test for Substantive Responsiveness**

The test for substantive responsiveness will include the following:

Check for substantive responsiveness
• Whether the Bid contains a priced offer.
• Whether the Bid materially complies with the scope and/or specification given
• Whether the following Technical pre-qualification/eligibility criteria set by Transnet have been met as follows: 1. Proof of completion of the OEM certified courses (course certificates) for Key Personnel: Senior Control Engineer - SCADA has completed the relevant intermediate, and advanced level process control system specialist courses (OEM certified) for either AVEVA OASyS DNA or AVEVA Enterprise SCADA Systems, as listed in the Works Information Section 6.3.3.

The test for substantive responsiveness [Step Two] must be passed for a Respondent's Proposal to progress to Step Three for the evaluation of Technical and Functionality

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3.11.4 **STEP THREE: Technical Evaluation**

The minimum number of evaluation points for Technical Evaluation is a Total score of **70** points.

Tenderers are to note that Key Personnel in the employ of a sub-contractor and sub-contractor Company Experience will not be evaluated or count towards the Technical Evaluation score for categories T2.2.02 and T2.2.03. For Key Personnel and Company Experience to be evaluated, the Key Personnel put forward must be in the employ of, and the Company Experience presented must relate to, the Company, Partnership, Joint Venture or Sole Proprietor submitting the bid.

Technical Evaluation Criteria

The Technical Evaluation criteria and maximum score in respect of each of the criteria are as follows:

ELIGIBILITY CRITERIA			
T.2.2.01	Key Personnel: Senior Control Engineer - SCADA has completed the relevant intermediate, and advanced level process control system specialist courses (OEM certified) for either AVEVA OASyS DNA or AVEVA Enterprise SCADA Systems, as listed in the Works Information Section 6.3.3	YES/NO	
Technical criteria (Desktop)	Sub-criteria	Sub-criteria points	Maximum number of points
T2.2-02: Key Persons Experience & Qualifications: Project Manager, Engineering Manager, Senior Control Engineer – SCADA, Senior Control Engineer – PLC, Senior Control Engineer – PLMS, Senior Systems Engineer	Key Persons Experience & Qualifications	35	35
T2.2-03: Company's Project Related Experience: in process control system development and deployment in petroleum pipeline environment	Number of successfully completed projects related to the development and deployment of process control systems within a petrochemical pipeline environment.	10	20

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	Number of experienced, competent, and qualified resources to complete the Works using multiple teams.	10	
T2.2-04: Project Schedule	Project Schedule submitted has a realistic and logical execution activity structure reflecting the different phases of the project, and lists all the main activities, required deliverables, key dates. Critical path scheduling is reflected and the Project Schedule is resource loaded. Basis of Schedule is provided.		10
T2.2-05: Method statement/ Execution Plan	A clear and concise Method Statement which covers all technical and project management aspects relevant to the project	10	20
	AVEVA Centre of Excellence Involvement	10	
T2.2-06: Presentation & Interview Tenderers will be required to attend a interview session with the Employer. The presentation should demonstrate and in depth understanding of both technical and project management aspects related to successfully completing a project of this nature within a petroleum pipeline environment.	The Tenderer is required to present a presentation covering all aspects of the bid submitted, including the following: 1. An introduction to the Consultant's team, including key personnel, their experience, and qualifications. 2. An overview of the Company's project related experience in successfully completing control system development and deployment projects within a petroleum pipeline environment. 3. An overview of the salient points associated with the Method Statement and Project Programme submitted.		15
Maximum possible score for Functionality			100

Functionality shall be scored independently by not less than 3 (three) evaluators and averaged in accordance with the following schedules:

- T2.2-02 **Evaluation Schedule:** Key Persons Experience & Qualifications
- T2.2-03 **Evaluation Schedule:** Company's Project Related Experience
- T2.2-04 **Evaluation Schedule:** Project Schedule
- T2.2-05 **Evaluation Schedule:** Method Statement / Execution Plan
- T2.2-06 **Evaluation Schedule:** Presentation & Interview

The scores of each of the evaluators will be averaged, weighted, and then totaled to obtain the final score for Technical Evaluation (Desktop), unless scored collectively. (See CIDB Inform Practice Note #9).

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Only those tenderers who attain the minimum number of evaluation points for Technical Evaluation will be eligible for further evaluation. Failure to meet the minimum threshold will result in the tender being disqualified and removed from any further consideration.

C.3.11.5 **STEP FOUR: Evaluation and Final Weighted Scoring**

Only tenders that pass the Technical Evaluation (Presentation & Interview) will be evaluated further in accordance with the 90/10 preference points systems as described in Preferential Procurement Regulations.

Evaluation Criteria	Final Weighted Scores
Price and Total Cost of Ownership	90
Specific goals - Scorecard	10
TOTAL SCORE:	100

Up to 100 minus W_1 tender evaluation points will be awarded to tenderers who complete the preferencing schedule and who are found to be eligible for the preference claimed. **Should the evidence required for any of the Specific Goals applicable in this tender not be provided, a tenderer will score zero preference points for that particular "Specific Goal".**

In terms of Transnet Preferential Procurement Policy (TPPP) and Procurement Manuals, the following preference points must be awarded to a bidder who provides the relevant required evidence for claiming points.

C.3.11.5.1 **Broad-Based Black Economic Empowerment criteria** [Weighted score 5 points]:

Selected Specific Goal	Number of points allocated (5)
B-BBEE Level of contributor – Level 1 or 2	5

The following Table represents the evidence to be submitted for claiming preference points for applicable specific goals in a particular tender:

Specific Goals	Acceptable Evidence
B-BBEE	B-BBEE Certificate / Sworn-Affidavit B-BBEE Certificate (in case of JV, a consolidate scorecard will be accept) as per DTIC guidelines

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C.3.11.5.2 Job Creation criteria [Weighted score 5 points]:

Selected Specific Goal	Number of points allocated (5)
Job-Creation schedule submitted indicating new jobs created	5

The following Table represents the evidence to be submitted for claiming preference points for applicable specific goals in a particular tender:

Specific Goals	Acceptable Evidence
Job Creation	T2.2-14 Job Creation Schedule, submitted as part of the RFP Returnables.

C.3.11.5.3 The maximum points for this bid are allocated as follows:

DESCRIPTION	POINTS
PRICE	90
B-BBEE Level of Contributor (1 or 2)	5
Job Creation criteria	5
Total points for Price and Specific Goals must not exceed	100

Note: Transnet reserves the right to carry out an independent audit of the tenderers scorecard components at any stage from the date of close of the tenders until completion of the contract.

C3.11.6 STEP FIVE: Objective Criteria (if applicable)

Transnet reserves the right to award the business to the highest scoring bidder/s unless objective criteria justify the award to another bidder. Transnet may apply the following objective criteria to the bid process:

- Skills Transfer and Capacity Building for Transnet;
- Impact on Transnet's Return On Investment;
- The tenderer:
 - is not under restrictions, or has principals who are under restrictions, preventing participating in the employer's procurement,
 - is not undergoing a process of being restricted by Transnet or other state institution that Transnet may be aware of,
 - can, as necessary and in relation to the proposed contract, demonstrate that

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he or she possesses the professional and technical qualifications, professional and technical competence, financial resources, equipment and other physical facilities, managerial capability, reliability, experience and reputation, expertise and the personnel, to perform the contract,

- has the legal capacity to enter into the contract,
 - is not insolvent, in receivership, under Business Rescue as provided for in chapter 6 of the Companies Act, 2008, bankrupt or being wound up, has his affairs administered by a court or a judicial officer, has suspended his business activities, or is subject to legal proceedings in respect of any of the foregoing,
 - complies with the legal requirements, if any, stated in the tender data, and
 - is able, in the option of the employer to perform the contract free of conflicts of interest.
-

C3.11.7 **STEP SIX: Post Tender Negotiations**

Respondents are to note that Transnet may not award a contract if the price offered is not market-related. In this regard, Transnet reserves the right to engage in PTN with the view to achieving a market-related price or to cancel the tender.

Negotiations will be done in a sequential manner i.e.:

- first negotiate with the highest ranked bidder or cancel the bid, should such negotiations fail,
- negotiate with the 2nd and 3rd ranked bidders (if required) in a sequential manner.

In the event of any Respondent being notified of such short-listed/preferred bidder status, his/her bid, as well as any subsequent negotiated best and final offers (BAFO), will automatically be deemed to remain valid during the negotiation period and until the ultimate award of business.

Should Transnet conduct post tender negotiations, Respondents will be requested to provide their best and final offers to Transnet based on such negotiations. Where a market related price has been achieved through negotiation, the contract will be awarded to the successful Respondent(s).

C3.11.8 **STEP SEVEN: Award of Business and Conclusion of Contract**

Immediately after approval to award the contract has been received, the successful or preferred bidder(s) will be informed of the acceptance of his/their Bid by way of a Letter of Award. Thereafter the final contract will be concluded with the successful Respondent(s).

A final contract will be concluded and entered into with the successful Bidder at the acceptance of a letter of award by the Respondent.

C.3.13 Tender offers will only be accepted if:

1. The tenderer or any of its directors/shareholders is not listed on the Register of Tender Defaulters in terms of the Prevention and Combating of Corrupt
-

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Activities Act of 2004 as a person prohibited from doing business with the public sector;

2. the tenderer does not appear on Transnet's list for restricted tenderers and National Treasury's list of Tender Defaulters;
3. the tenderer has fully and properly completed the Compulsory Enterprise Questionnaire and there are no conflicts of interest which may impact on the tenderer's ability to perform the contract in the best interests of the Employer or potentially compromise the tender process and persons in the employ of the state.
4. Transnet reserves the right to award the tender to the tenderer who scores the highest number of points overall, unless there are **objective criteria** which will justify the award of the tender to another tenderer. Objective criteria include but are not limited to the outcome of a due diligence exercise to be conducted. The due diligence exercise may take the following factors into account inter alia;

the tenderer:

- a) is not under restrictions, or has principals who are under restrictions, preventing participating in the employer's procurement,
- b) is not undergoing a process of being restricted by Transnet or other state institution that Transnet may be aware of,
- c) can, as necessary and in relation to the proposed contract, demonstrate that he or she possesses the professional and technical qualifications, professional and technical competence, financial resources, equipment and other physical facilities, managerial capability, reliability, experience and reputation, expertise and the personnel, to perform the contract,
- d) has the legal capacity to enter into the contract,
- e) is not insolvent, in receivership, under Business Rescue as provided for in chapter 6 of the Companies Act, 2008, bankrupt or being wound up, has his affairs administered by a court or a judicial officer, has suspended his business activities, or is subject to legal proceedings in respect of any of the foregoing,
- f) complies with the legal requirements, if any, stated in the tender data and
- g) is able, in the option of the employer to perform the contract free of conflicts of interest.

C.3.17	The number of paper copies of the signed contract to be provided by the Employer is 1 (one).
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Part T2: Returnable Documents

Description of the Works: **Inland Network Automation Project** which includes the provision of design, engineering, supply, procurement, fabrication, software development, testing, installation, commissioning and handover of Process Control, Integrated Custody Metering and Pipeline Monitoring Systems to all Transnet Pipelines Inland Stations, Master, and Secondary Control Centres – **Main Automation Contract**.

T2.1 List of Returnable Documents

2.1.1 These schedules are required for pre-qualification and eligibility purposes:

- T2.2-01 **Eligibility Criteria Schedule:** Senior Control Engineer – SCADA Qualifications
- T2.2-02 **Evaluation Schedule:** Key Persons Experience & Qualifications
- T2.2-03 **Evaluation Schedule:** Company's Project Related Experience
- T2.2-04 **Evaluation Schedule:** Project Schedule
- T2.2-05 **Evaluation Schedule:** Method Statement / Execution Plan
- T2.2-06 **Evaluation Schedule:** Presentation & Interview

2.1.2 Returnable Schedules:

General:

- T2.2-07 Certificate of Attendance at Compulsory Tender Clarification Meeting
- T2.2-08 Authority to submit tender
- T2.2-09 Record of addenda to tender documents
- T2.2-10 Letter of Good Standing with Workmen's Compensation Fund
- T2.2-11 Risk Elements
- T2.2-12 Schedule of proposed Subcontractors
- T2.2-13 ANNEX G Compulsory Enterprise Questionnaire
- T2.2-14 Job-Creation Schedule

Agreement and Commitment by Tenderer:

- T2.2-15 Non-Disclosure Agreement
- T2.2-16 RFP Declaration Form
- T2.2-17 RFP – Breach of Law
- T2.2-18 Certificate of Acquaintance with Tender Document
- T2.2-19 Service Provider Integrity Pact
- T2.2-20 Supplier Code of Conduct
- T2.2-26 Agreement in terms of Protection of Personal Information Act (POPIA)

1.3.2 Bonds/Guarantees/Financial/Insurance:

- T2.2-21 Insurance provided by the Contractor
- T2.2-22 Form of Intent to provide a Performance Guarantee
- T2.2-23 Foreign Exchange requirements
- T2.2-24 Three (3) years audited financial statements

Description of the Works: **Inland Network Automation Project** which includes the provision of design, engineering, supply, procurement, fabrication, software development, testing, installation, commissioning and handover of Process Control, Integrated Custody Metering and Pipeline Monitoring Systems to all Transnet Pipelines Inland Stations, Master, and Secondary Control Centres – **Main Automation Contract**.

1.3.3 Transnet Vendor Registration Form:

T2.2-25 Transnet Supplier Declaration Form

2.2 C1.1 Offer portion of Form of Offer & Acceptance

2.3 C1.2 Contract Data

2.5 C2.1 Pricing Instructions (Activity Schedule)

2.6 C2.2 Activity Schedule

TENDER NUMBER: **TPL/2024/06/0005/68787/RFP**

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Compulsory Returnable**T2.2-01: Eligibility Criteria Schedule:****Senior Control Engineer – SCADA Qualifications**

This schedule and supporting documentation, confirms that Key Personnel: Senior Control Engineer - SCADA has completed the relevant intermediate, and advanced level process control system specialist courses (OEM certified) for either AVEVA OASyS DNA 2018 or AVEVA Enterprise SCADA Systems, as listed in the Works Information Section 6.3.3.

Proof of completion of the OEM certified courses (course certificates) must be submitted with your Tender as proof.

	Date	Name	Course Title or Details
1			
2			
3			
4			
5			
6			
7			

Signed at

Date

Name

Position

Tenderer

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Compulsory Returnable

T2.2-02: Evaluation Schedule – Key Persons Experience and Qualifications

The Consultant shall submit a Project Organisation Chart depicting the proposed staff allocation to the project. The chart shall identify key management and technical skills supported by CV's demonstrating the requisite project experience and qualifications using the attached CV format (Appendix G). Proof of qualifications, in the form of certified copies not older than 12 months, shall be submitted for all key personnel e.g. National Diploma, B-Tech/BSc Degree and Professional Registration.

Key Persons comprise of the following:

1. Project Manager
2. Engineering Manager
3. Senior Control Engineer – SCADA (OASyS DNA or AVEVA Enterprise SCADA)
4. Senior Control Engineer – PLC
5. Senior Control Engineer – PLMS
6. Senior Systems Engineer

The following must be submitted as a minimum:

- Key Persons Curriculum Vitae (Appendix G)
- Key Persons Proof of qualifications and professional registration

The tenderer must attach the relevant Key Persons Curriculum Vitae to this page.

Index of documentation attached to this schedule

	DOCUMENT NAME
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Key for scoring for Project Manager's experience.

Key for Project Manager's Experience Max 5 points	0	No information submitted or CV submitted with irrelevant experience.
	20	CV submitted with less than five (5) years of industrial project co-ordination experience, and no experience in managing multi-interface, process control software projects and international project teams.
	40	CV submitted with less than five (5) years of industrial project co-ordination experience, and less than three (3) years experience in managing multi-

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		interface, process control software projects as well as experience in managing international project teams.
	60	CV submitted with five (5) or more years of industrial project co-ordination experience, including having managed at least one project of value > R150m, and less than three (3) years' experience in managing multi-interface, process control software projects as well as experience in managing international project teams.
	80	CV submitted with five (5) or more years of industrial project co-ordination experience, including having managed at least one project of value > R150m, and three (3) or more years but less than five (5) years' experience in managing multi-interface, process control software projects as well as experience in managing international project teams.
	100	CV submitted with five (5) or more years of industrial project co-ordination experience, including having managed at least one project of value > R150m, and five (5) or more years' experience in managing multi-interface, process control software projects as well as experience in managing international project teams.

Key for scoring for Engineering Manager's experience.

Key for Engineering Manager's Experience Max 5 points	0	No information submitted or CV submitted with irrelevant experience.
	20	CV submitted with less than five (5) years of petrochemical experience in a project development environment, and no experience in managing international software teams, and multi-system integration.
	40	CV submitted with less than five (5) years of petrochemical experience in a project development environment, and less than three (3) years' experience in managing international software development teams, and multi-system integration.
	60	CV submitted with five (5) or more years of petrochemical experience in a project development environment, and less than three (3) years' experience in managing international software development teams, and multi-system integration.
	80	CV submitted with five (5) or more years of petrochemical experience in a project development environment, and three (3) or more years but less than five (5) years in managing international software development teams, and multi-system integration.
	100	CV submitted with five (5) or more years of petrochemical experience in a project development environment, and five (5) or more years in managing international software development teams, and multi-system integration.

Key for scoring for Senior Control Engineer - SCADA's experience.

Key for Senior Control Engineer – SCADA (OASyS DNA/AVEVA Enterprise SCADA) Experience Max 10 points	0	No information submitted or CV submitted with irrelevant experience.
	20	CV submitted for one Senior Control Engineer with less than three (3) years' experience in the design, configuration, software development, testing and deployment of any process control system into a petroleum pipeline environment.
	40	CV submitted for one Senior Control Engineer with less than three (3) years' experience in the design, configuration, software development, testing and deployment of either AVEVA OASyS DNA or AVEVA Enterprise SCADA Systems into a petroleum pipeline environment.
	60	CV submitted for one Senior Control Engineer, with three (3) or more years but less than five (5) years' experience in the design, configuration, software development, testing and deployment of either AVEVA OASyS DNA or AVEVA

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		Enterprise SCADA Systems, including Liquid Management Suite (LMS) applications, into a petroleum pipeline environment.
	80	CV's submitted for two Senior Control Engineers, each with three (3) or more years but less than five (5) years' experience in the design, configuration, software development, testing and deployment of either AVEVA OASyS DNA or AVEVA Enterprise SCADA Systems, including Liquid Management Suite (LMS) applications, into a petroleum pipeline environment.
	100	CV's submitted for two Senior Control Engineers, each with five (5) or more years' experience in the design, configuration, software development, testing and deployment of either AVEVA OASyS DNA or AVEVA Enterprise SCADA Systems, including Liquid Management Suite (LMS) applications, into a petroleum pipeline environment.

Key for scoring for Senior Control Engineer - PLC experience.

Key for Senior Control Engineer – PLC Experience Max 5 points	0	No information submitted or CV submitted with irrelevant experience.
	20	CV submitted for one Senior Control Engineer with less than three (3) years' experience in the design, configuration, software development, testing and deployment of Schneider m580 PLC Systems into a petrochemical environment.
	40	CV submitted for one Senior Control Engineer with less than three (3) years' experience in the design, configuration, software development, testing and deployment of Schneider m580 PLC Systems into a petrochemical environment, and has completed relevant process control specialist courses (OEM certified) for Schneider m580 PLCs, listed in the Works Information Section 6.3.4.
	60	CV submitted for one Senior Control Engineer with three (3) or more years but less than five (5) years' experience in the design, configuration, software development, testing and deployment of Schneider m580 PLC Systems into a petrochemical environment, and has completed relevant process control specialist courses (OEM certified) for Schneider m580 PLCs, listed in the Works Information Section 6.3.4.
	80	CV's submitted for two Senior Control Engineers, each with three (3) or more years but less than five (5) years' experience in the design, configuration, software development, testing and deployment of Schneider m580 PLC Systems into a petrochemical environment, and has completed relevant process control specialist courses (OEM certified) for Schneider m580 PLCs, listed in the Works Information Section 6.3.4.
	100	CV's submitted for two Senior Control Engineers, each with five (5) or more years' experience in the design, configuration, software development, testing and deployment of Schneider m580 PLC Systems into a petroleum pipeline environment, and has completed relevant process control specialist courses (OEM certified) for Schneider m580 PLCs, listed in the Works Information Section 6.3.4.

Key for scoring for Senior Control Engineer - PLMS experience.

Key for Senior Control Engineer – PLMS Experience Max 5 points	0	No information submitted or CV submitted with irrelevant experience.
	20	CV submitted with less than three (3) years' experience in the design, configuration, software development, testing and deployment of AVEVA Pipeline Integrity Monitor (PIM) / SimSuite Software into a petroleum pipeline environment.

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	40	CV submitted with less than three (3) years' experience in the design, configuration, software development, testing and deployment of AVEVA Pipeline Integrity Monitor (PIM) / SimSuite Software into a petroleum pipeline environment; and has completed all the relevant specialist courses (OEM certified) for AVEVA Pipeline Integrity Monitor (PIM) / SimSuite Software, listed in the Works Information Section 6.3.5.
	60	CV submitted with three (3) or more years but less than five (5) years' experience in the design, configuration, software development, testing and deployment of AVEVA Pipeline Integrity Monitor (PIM) / SimSuite Software (Leak Detection applications only) into a petroleum pipeline environment; and has completed all the relevant specialist courses (OEM certified) for AVEVA Pipeline Integrity Monitor (PIM) / SimSuite Software, listed in the Works Information Section 6.3.5.
	80	CV submitted with three (3) or more years but less than five (5) years' experience in the design, configuration, software development, testing and deployment of AVEVA Pipeline Integrity Monitor (PIM) / SimSuite Software (Leak Detection, Batch and Pig/Sphere Tracking applications) into a petroleum pipeline environment; and has completed all the relevant specialist courses (OEM certified) for AVEVA Pipeline Integrity Monitor (PIM) / SimSuite Software, listed in the Works Information Section 6.3.5.
	100	CV submitted with five (5) or more years' experience in the design, configuration, software development, testing and deployment of AVEVA Pipeline Integrity Monitor (PIM) / SimSuite Software (Leak Detection, Batch and Pig/Sphere Tracking applications) into a petroleum pipeline environment; and has completed all the relevant specialist courses (OEM certified) for AVEVA Pipeline Integrity Monitor (PIM) / SimSuite Software, listed in the Works Information Section 6.3.5.

Key for scoring for Senior Systems Engineer experience.

Key for Senior Systems Engineer Experience Max 5 points	0	No information submitted or CV submitted with irrelevant experience.
	20	CV submitted with less than three (3) years' experience in the design, configuration, setup, testing and deployment of Process Control System hardware in a Microsoft Windows environment; as well as the setup, configuration, and deployment of CISCO networks.
	40	CV submitted with less than three (3) years' experience in the design, configuration, setup, testing and deployment of Process Control System hardware in a Microsoft Windows environment; as well as the setup, configuration, and deployment of CISCO networks; and holds a Microsoft Certified Systems Engineering qualification.
	60	CV submitted with three (3) or more years but less than five (5) years' experience in the design, configuration, setup, testing and deployment of Process Control System hardware in a Microsoft Windows environment; as well as the setup, configuration, and deployment of CISCO networks; and holds a Microsoft Certified Systems Engineering qualification.
	80	CV submitted with three (3) or more years but less than five (5) years' experience in the design, configuration, setup, testing and deployment of Process Control System hardware in a Microsoft Windows environment, of which two (2) or more years have involved setup, configuration, and deployment of servers in a HyperV virtual environment; as well as the setup, configuration, and deployment of CISCO networks; and holds a Microsoft Certified Systems Engineering qualification.



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	100	CV submitted with five (5) or more years' experience in the design, configuration, setup, testing and deployment of Process Control System hardware in a Microsoft Windows environment, of which two (2) or more years have involved setup, configuration, and deployment of servers in a HyperV virtual environment; as well as the setup, configuration, and deployment of CISCO networks; and holds a Microsoft Certified Systems Engineering qualification.
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Signed at _____ Date _____

Name _____ Position _____

Tenderer _____



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Compulsory Returnable

T2.2-03: Evaluation Schedule – Company’s Project Related Experience

Contractors are required to demonstrate both proven experience and competency in the design, configuration, software development, testing and deployment of the following process control systems in a petroleum pipeline environment:

- AVEVA OASys DNA SCADA interfaced to Schneider m580 PLCs for control and monitoring, interfaced to Emerson S600+ Flow Computers for custody metering, and PIM™ for pipeline monitoring,
- AVEVA Enterprise SCADA interfaced to Schneider m580 PLCs for control and monitoring, interfaced to Emerson S600+ Flow Computers for custody metering, and PIM™ for pipeline monitoring.

The Contractor shall supply a sufficiently detailed reference list using the provided Company’s experience sheet. The scoring for this criterion will be based on number of relevant successfully completed projects as well as the project values. Evidence of completed projects should be provided in the form of third-party reference letters and/or project completion certificates.

Contractors are also required to demonstrate that they have an adequate number of experienced, competent, and qualified resources to complete the *Works* using multiple teams, in accordance with the Key Dates and Project Execution Plan proposed. In this regard, the Contractor shall provide a minimum of two teams dedicated to working concurrently on PCS/CMS software (SCADA and PLC) development, as well as a third team dedicated to PLMS software development. [Note: The word 'Team' is defined as a group of competent, qualified PLC and SCADA process control software development resources that are deployed to a specific software development work stream.]

The Contractor shall submit a Project Organisation Chart depicting the proposed staff allocation to the project.

The following must be submitted as a minimum:

- Completed company’s experience sheet (Appendix H)
- Detailed Project Organisation Chart (Organogram)
- CV’s of all members of the software teams proposed

The tenderer must attach the Company’s experience sheet and Organogram to this page.

Index of documentation attached to this schedule

	DOCUMENT NAME
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The scoring of the Company’s Project Related Experience will be as follows:

Number of Successfully	0	The Contractor did not list any projects completed or the projects submitted are not relevant.
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Completed Projects related to the development and deployment of process control systems within a petroleum pipeline environment. Max 20 points	20	The Contractor has completed one (1) or more projects related to the development and deployment of process control systems within a petrochemical environment; of which none are related to the development and deployment of either Aveva OASyS DNA or AVEVA Enterprise SCADA systems into a petroleum pipeline environment.
	40	The Contractor has completed two (2) or more projects related to the development and deployment of process control systems within a petrochemical environment, of which one (1) project is related to the development and deployment of either Aveva OASyS DNA or AVEVA Enterprise SCADA systems into a petroleum pipeline environment, but with a project of value less than R 50 mil.
	60	The Contractor has completed two (2) or more projects related to the development and deployment of process control systems within a petrochemical environment, of which one (1) project is related to the development and deployment of either Aveva OASyS DNA or AVEVA Enterprise SCADA systems into a petroleum pipeline environment, with a project of value greater than or equal to R 50 mil.
	80	The Contractor has completed two (2) or more projects related to the development and deployment of process control systems within a petrochemical environment, of which two (2) projects are related to the development and deployment of either Aveva OASyS DNA or AVEVA Enterprise SCADA systems into a petroleum pipeline environment, each with a project of value greater than or equal to R 50 mil.
	100	The Contractor has completed three (3) or more projects related to the development and deployment of process control systems within a petrochemical environment, of which three (3) or more projects are related to the development and deployment of either Aveva OASyS DNA or AVEVA Enterprise SCADA systems into a petroleum pipeline environment, each with project values of greater than or equal to R 50 mil.

The scoring of the number of experienced, competent, and qualified resources to complete the *Works* using multiple work will be as follows:

Number of experienced, competent, and qualified resources to complete the Works using multiple work streams Max 10 points	0	No project organogram submitted or the project organogram submitted was not clear and/or not relevant to the project.
	20	Project Organogram submitted reflected key positions, hierarchy, functions, responsibilities and reporting structures required. Key personnel were named on the organogram. Software development teams were not reflected.
	40	Project Organogram submitted reflected key positions, hierarchy, functions, responsibilities and reporting structures required. Key personnel were named on the organogram. A minimum of three software development teams were reflected (two for PCS software and one for PLMS software).
	60	Project Organogram submitted reflected key positions, hierarchy, functions, responsibilities and reporting structures required. Key personnel were named on the organogram. A minimum of three software development teams were



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		reflected (two for PCS software and one for PLMS software). CV's of all members of the software teams listed has been provided.
	80	Project Organogram submitted reflected key positions, hierarchy, functions, responsibilities and reporting structures required. Key personnel were named on the organogram. A minimum of three software development teams were reflected (two for PCS software and one for PLMS software). CV's of all members of the software teams listed has been provided. Resources allocated match those reflected in the resource loaded project schedule.
	100	Project Organogram submitted reflected key positions, hierarchy, functions, responsibilities and reporting structures required. Key personnel were named on the organogram. A minimum of three software development teams were reflected (two for PCS software and one for PLMS software). CV's of all members of the software teams listed has been provided. Resources allocated match those reflected in the resource loaded project schedule. Narrative has been provided, detailing scope of responsibilities of key resources and reporting structures, in relation to the project.

Signed at _____ Date _____

Name _____ Position _____

Tenderer _____

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T2.2-04: Evaluation Schedule – Project Schedule

Compulsory Returnable

Submit a Project Schedule that includes and demonstrates the following as a minimum with your tender document:

1. Project Schedule submitted is compliant to AACE Level 3.
2. Project Schedule submitted has a realistic and logical execution activity structure reflecting the different phases of the project, and lists all the main activities and required deliverables.
3. Critical Path Scheduling is provided in the schedule.
4. Project Schedule is resource loaded.
5. Basis of Schedule is submitted, and details project schedule assumptions, risks and risk mitigations.
6. The project schedule adheres to the Contract Completion Date.

The tenderer must attach his / her Project Schedule to this page.

Index of documentation attached to this schedule

	DOCUMENT NAME
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The scoring of the Method Statement / Execution Plan will be as follows:

Key for Project Schedule Assessment Max 15 points	0	No project schedule submitted or the project schedule submitted did not meet minimum requirements (AACE Level 3) regarding execution structure, project phasing, main activities and required deliverables and project durations.
	20	Project Schedule submitted met minimum requirements (AACE Level 3), had a realistic and logical execution structure, reflected the different phases of the project, and listed all the main activities and required deliverables.
	40	Project Schedule submitted met minimum requirements (AACE Level 3), had logical execution structure, reflected the different phases of the project, and listed all the main activities and required deliverables. Critical path scheduling was reflected.
	60	Project Schedule submitted met minimum requirements (AACE Level 3), had a realistic and logical execution structure, reflected the different phases of the project, and listed all the main activities and required deliverables. Critical path scheduling was reflected. The project schedule was resource loaded.
	80	Project Schedule submitted met minimum requirements (AACE Level 3), had a realistic and logical execution structure, reflected the different phases of the project, and listed all the main activities and required deliverables. Critical path scheduling was reflected. The project schedule was resource loaded. The Basis of Schedule provided detailed project schedule assumptions, risks and risk mitigations.



DESCRIPTION OF THE WORKS: FOR THE PROVISION OF DESIGN, ENGINEERING, SUPPLY, PROCUREMENT, FABRICATION, SOFTWARE DEVELOPMENT, TESTING, INSTALLATION, COMMISSIONING AND HANDOVER OF PROCESS CONTROL, INTEGRATED CUSTODY METERING AND PIPELINE MONITORING SYSTEMS TO ALL TRANSNET PIPELINES INLAND STATIONS, MASTER, AND SECONDARY CONTROL CENTRES – **MAIN AUTOMATION CONTRACT**

	100	Project Schedule submitted met minimum requirements (AACE Level 3), had a realistic and logical execution structure, reflected the different phases of the project, and listed all the main activities and required deliverables. Critical path scheduling was reflected. The project schedule was resource loaded. The Basis of Schedule provided detailed project schedule assumptions, risks and risk mitigations. The project schedule adheres to the Contract Completion Date.
--	-----	---

Signed at _____ Date _____

Name _____ Position _____

Tenderer _____



Transnet Pipelines.

Tender Number: **TPL/2024/06/0005/68787/RFP**

Description of the Works: **Inland Network Automation Project** which includes the provision of design, engineering, supply, procurement, fabrication, software development, testing, installation, commissioning and handover of Process Control, Integrated Custody Metering and Pipeline Monitoring Systems to all Transnet Pipelines Inland Stations, Master, and Secondary Control Centres – **Main Automation Contract**.

Compulsory Returnable

T2.2-05: Evaluation Schedule – Method Statement / Execution Plan

Submit a Method Statement / Execution Plan that includes and demonstrates the following as a minimum with your tender document:

1. Includes a comprehensive project execution plan detailing each project stage (Development and Execution) as stated in the *Works Information*.
2. Demonstrates an understanding of the objectives of the project and the *Employer's* stated and implied requirements, highlights the issues of importance, and explains the technical approach they would adopt to address them.
3. Demonstrates an in-depth understanding of the scope of work.
4. Includes a high-level project Risk Register and Quality Management Plan.
5. Demonstrates an understanding of project deliverables listed in Appendix D of the *Works Information*.
6. Details the extent to which the OEM Centre of Excellence (CoE) is involved in the design, development, testing, review and certification of Phase 1 Development and Phase 2 Execution deliverables.

The tenderer must attach his / her Method Statement/Execution Plan to this page.

Index of documentation attached to this schedule

	DOCUMENT NAME
1	
2	

The scoring of the Method Statement / Execution Plan will be as follows:

Key for Method Statement / Execution Plan Max 10 points	0	No Method Statement submitted or Method Statement did not cover all technical and project management aspects relevant to the project. The proposal did not demonstrate how the Contractor will ensure safe work while not compromising quality of the deliverables.
	20	Method statement was clear, concise, and covered all technical and project management aspects relevant to the project. The proposal included a high-level project execution plan detailing each project stage (Development and Execution) as stated in the Works Information. The Contractors method statement did not demonstrate an adequate understanding of the scope of work.
	40	Method statement was clear, concise, and covered all technical and project management aspects relevant to the project. The proposal included a high-level project execution plan detailing each project stage (Development and Execution) as stated in the Works Information. The Contractors method statement demonstrated an adequate understanding of the scope of work.



Transnet Pipelines.

Tender Number: **TPL/2024/06/0005/68787/RFP**

Description of the Works: **Inland Network Automation Project** which includes the provision of design, engineering, supply, procurement, fabrication, software development, testing, installation, commissioning and handover of Process Control, Integrated Custody Metering and Pipeline Monitoring Systems to all Transnet Pipelines Inland Stations, Master, and Secondary Control Centres – **Main Automation Contract**.

	60	Method statement was clear, concise, and covered all technical and project management aspects relevant to the project. The proposal included a high-level project execution plan detailing each project stage (Development and Execution) as stated in the Works Information. The Contractors method statement demonstrated an adequate understanding of the scope of work. The Method Statement addressed the requirements listed in the Works Information Section 3.4 Tables 3-2, 3-3, 3-4.
	80	Method statement was clear, concise, and covered all technical and project management aspects relevant to the project. The proposal included a high-level project execution plan detailing each project stage (Development and Execution) as stated in the Works Information. The Contractors method statement demonstrated an adequate understanding of the scope of work. The Method Statement addressed the requirements listed in the Works Information Section 3.4 Tables 3-2, 3-3, 3-4. A high-level project Risk Register was provided.
	100	Method statement was clear, concise, and covered all technical and project management aspects relevant to the project. The proposal included a high-level project execution plan detailing each project stage (Development and Execution) as stated in the Works Information. The Contractors method statement demonstrated an adequate understanding of the scope of work. The Method Statement addressed the requirements listed in the Works Information Section 3.4 Tables 3-2, 3-3, 3-4. A high-level project Risk Register and Quality Management Plan was provided.

The scoring of the AVEVA Centre of Excellence involvement will be as follows:

AVEVA Centre of Excellence Involvement Max 10 points	0%	Execution methodology shows little AVEVA CoE involvement or the involvement is not confirmed by AVEVA CoE in writing.
	60%	AVEVA CoE reviews the final deliverables and signs off that the deliverables have been developed according to best practices for all Phase 1 Development deliverables and Phase 2 System Staging deliverables, as identified in the Works Information (Table 3-2, Table 3-3). Involvement is confirmed in writing by AVEVA CoE.
	100%	AVEVA CoE is involved in the design, development, and testing of all Phase 1 Development deliverables and Phase 2 System Staging deliverables, as identified in the Works Information (Table 3-2, 3-3). AVEVA CoE reviews the final deliverables and signs off that the deliverables have been developed according to best practices. Involvement is confirmed in writing by AVEVA CoE.

Signed at

Date

Name

Position

Tenderer

DESCRIPTION OF THE WORKS: FOR THE PROVISION OF DESIGN, ENGINEERING, SUPPLY, PROCUREMENT, FABRICATION, SOFTWARE DEVELOPMENT, TESTING, INSTALLATION, COMMISSIONING AND HANDOVER OF PROCESS CONTROL, INTEGRATED CUSTODY METERING AND PIPELINE MONITORING SYSTEMS TO ALL TRANSNET PIPELINES INLAND STATIONS, MASTER, AND SECONDARY CONTROL CENTRES – **MAIN AUTOMATION CONTRACT**.

Compulsory Returnable

T2.2-06: Evaluation Schedule – Presentation & Interview

The Contractor is required to attend an interview session with the Employer. At this interview, the Contractor is required to present a presentation covering all aspects of the bid submitted, including the following:

1. An introduction to the Contractor's team, including key personnel, their experience, and qualifications.
2. An overview of the Company's project related experience in successfully completing control system development and deployment projects within a petroleum pipeline environment.
3. An overview of the salient points associated with the Method Statement and Project Programme submitted.
4. Clarification of all queries related to the Contractor's Offer and scope of work.

The presentation should demonstrate and in depth understanding of both technical and project management aspects related to successfully completing a project of this nature within a petroleum pipeline environment.

The scoring of the Presentation and Interview will be as follows:

Key for Presentation and Interview Max 100 points Min 60 points	0%	No presentation prepared or key resources were not available for interviews.
	20%	The presentation did not cover all minimum requirements and the Contractor was unable to satisfactorily clarify all major queries related to Contractor's Offer and scope of work.
	40%	The presentation covered all minimum requirements and the Contractor was able to satisfactorily clarify all major queries related to Contractor's Offer and scope of work.
	60%	The presentation was a true reflection of the information submitted with the Contractor's Offer. The Contractor demonstrated a good understanding of all aspects of his bid and was able to satisfactorily clarify all queries related to Contractor's Offer. The Contractor demonstrated a limited understanding of the scope of work and the execution strategy required to complete the Works.
	80%	The presentation was a true reflection of the information submitted with the Contractor's Offer. The Contractor demonstrated a good understanding of all aspects of his bid and was able to satisfactorily clarify all queries related to Contractor's Offer. The Contractor demonstrated a good understanding of the scope of work and the execution strategy required to complete the Works.
	100%	The presentation was a true reflection of the information submitted with the Contractor's Offer. The Contractor demonstrated a good understanding of all aspects of his bid and was able to satisfactorily clarify all queries related to Contractor's Offer. The Contractor demonstrated a good understanding of the scope of work and the execution strategy required to complete the Works. The Contractor also provided additional information demonstrating how the project will be executed referencing to similar completed projects.



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Signed at	_____	Date	_____
Name	_____	Position	_____
Tenderer	_____		

TENDER NUMBER: **TPL/2024/06/0005/68787/RFP**

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T2.2-07: Eligibility Criteria Schedule:

Certificate of Attendance at Tender Clarification Meeting

This is to certify that

(Company Name)

Represented
by:

(Name and
Surname)

Was represented at the tender clarification meeting

Held at:		
On (date)		Starting time:

Particulars of person(s) attending the meeting:

Name

Signature

Capacity

Attendance of the above company at the meeting was confirmed:

Name

Signature

**For and on Behalf of the
Employers Agent.**

Date

DESCRIPTION OF THE WORKS: FOR THE PROVISION OF DESIGN, ENGINEERING, SUPPLY, PROCUREMENT, FABRICATION, SOFTWARE DEVELOPMENT, TESTING, INSTALLATION, COMMISSIONING AND HANDOVER OF PROCESS CONTROL, INTEGRATED CUSTODY METERING AND PIPELINE MONITORING SYSTEMS TO ALL TRANSNET PIPELINES INLAND STATIONS, MASTER, AND SECONDARY CONTROL CENTRES – **MAIN AUTOMATION CONTRACT.**

T2.2-08: Authority to submit a Tender

Indicate the status of the tenderer by ticking the appropriate box hereunder. The tenderer must complete the certificate set out below for his category of organisation or alternatively attach a certified copy of a company / organisation document which provides the same information for the relevant category as requested here.

A - COMPANY	B - PARTNERSHIP	C - JOINT VENTURE	D - SOLE PROPRIETOR

A. Certificate for Company

I, _____, chairperson of the board of directors of _____, hereby confirm that by resolution of the board taken on _____ (date), Mr/Ms _____, acting in the capacity of _____, was authorised to sign all documents in connection with this tender offer and any contract resulting from it on behalf of the company.

Signed

Date

Name

Position

Chairman of the Board of Directors

B. Certificate for Partnership

We, the undersigned, being the **key partners** in the business trading as _____ hereby authorise Mr/Ms _____, acting in the capacity of _____, to sign all documents in connection with the tender offer for Contract _____ and any contract resulting from it on our behalf.

Name	Address	Signature	Date

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NOTE: This certificate is to be completed and signed by the full number of Partners necessary to commit the Partnership. Attach additional pages if more space is required.

C. Certificate for Joint Venture

We, the undersigned, are submitting this tender offer in Joint Venture and hereby authorise Mr/Ms _____, an authorised signatory of the company _____, acting in the capacity of lead partner, to sign all documents in connection with the tender offer for Contract _____ and any contract resulting from it on our behalf.

This authorisation is evidenced by the attached power of attorney signed by legally authorised signatories of all the partners to the Joint Venture.

Furthermore we attach to this Schedule a copy of the joint venture agreement which incorporates a statement that all partners are liable jointly and severally for the execution of the contract and that the lead partner is authorised to incur liabilities, receive instructions and payments and be responsible for the entire execution of the contract for and on behalf of any and all the partners.

Name of firm	Address	Authorising signature, name (in caps) and capacity

D. Certificate for Sole Proprietor

I, _____, hereby confirm that I am the sole owner of the business trading as _____.

Signed _____ Date _____

Name _____ Position _____ Sole Proprietor

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T2.2-09: Record of Addenda to Tender Documents

This schedule as submitted confirms that the following communications received from the *Employer* before the submission of this tender offer, amending the tender documents, have been taken into account in this specific tender offer:

	Date	Title or Details
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

DESCRIPTION OF THE WORKS: FOR THE PROVISION OF DESIGN, ENGINEERING, SUPPLY, PROCUREMENT, FABRICATION, SOFTWARE DEVELOPMENT, TESTING, INSTALLATION, COMMISSIONING AND HANDOVER OF PROCESS CONTROL, INTEGRATED CUSTODY METERING AND PIPELINE MONITORING SYSTEMS TO ALL TRANSNET PIPELINES INLAND STATIONS, MASTER, AND SECONDARY CONTROL CENTRES – **MAIN AUTOMATION CONTRACT.**

Attached to this schedule is the Letter/s of Good Standing.

- Name of Company/Members of Joint Venture:

[illegible]

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Tenderers to identify and evaluate the potential risk elements associated with the Works and possible mitigation thereof. The risk elements and the mitigation as identified thereof by the Tenderer are to be submitted.

Tenderers are also to evaluate any risk/s stated by the *Employer* in Contract Data Part C1, and provide possible mitigation thereof.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There is a vertical margin line on the left side, creating a narrow left margin. The paper appears to be from a notebook or a standard ruled document.

Part T2: Returnable Schedules

DESCRIPTION OF THE WORKS: FOR THE PROVISION OF DESIGN, ENGINEERING, SUPPLY, PROCUREMENT, FABRICATION, SOFTWARE DEVELOPMENT, TESTING, INSTALLATION, COMMISSIONING AND HANDOVER OF PROCESS CONTROL, INTEGRATED CUSTODY METERING AND PIPELINE MONITORING SYSTEMS TO ALL TRANSNET PIPELINES INLAND STATIONS, MASTER, AND SECONDARY CONTROL CENTRES – **MAIN AUTOMATION CONTRACT.**

T2.2-12: Schedule of Proposed Sub Contractors:

Tenderer to note that any deviations from this list of proposed sub-contractors will be subject to acceptance by the *Employer's Agent* in terms of the Conditions of Contract. Please also read the applicable Z Clauses in the Contract Data by Employer.

Provide information of the Sub-consultants below:

	Name of proposed Sub-contractors	Proposed Sub-contractor: National Treasury Central Supplier Database Registration Number	Nature and extent of work	B-BBEEE Certificates or Sworn Affidavit attached to this schedule? Yes/No	Amount of work sub-consulted in Rands (excl. 15% Vat)	Percentage (%) of the sub-consulted amount in terms of the tendered total of the prices.
1.						
2.						
3.						
4.						

The Tenderer is to submit the following documents or copies thereof for each of the proposed sub-consultant(s) with this schedule:

Valid B-BBEE Sworn Affidavits or B-BBEE Certificates of each of the proposed sub-consultant(s).

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T2.2-13 : ANNEX G Compulsory Enterprise Questionnaire

The following particulars hereunder must be furnished.

In the case of a Joint Venture, separate enterprise questionnaires in respect of each partner/member must be completed and submitted.

1. Section 1: Name of enterprise: _____

2. Section 2: VAT registration number, if any: _____

3. Section 3: CIDB registration number, if any: _____

4. Section 4: CSD number: _____

5. Section 5: Particulars of sole proprietors and partners in partnerships

Name	Identity number	Personal income tax number

* Complete only if sole proprietor or partnership and attach separate page if more than 3 partners

6. Section 6: Particulars of companies and close corporations

Company registration number _____

Close corporation number _____

Tax reference number: _____

Section 7: The attached SBD4 must be completed for each tender and be attached as a tender requirement.

Section 8: The attached SBD 6 must be completed for each tender and be attached as a requirement.

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The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise:

- i) authorizes the Employer to obtain a tax clearance certificate from the South African Revenue Services that my / our tax matters are in order;
- ii) confirms that the neither the name of the enterprise or the name of any partner, manager, director or other person, who wholly or partly exercises, or may exercise, control over the enterprise appears on the Register of Tender Defaulters established in terms of the Prevention and Combating of Corrupt Activities Act of 2004;
- iii) confirms that no partner, member, director or other person, who wholly or partly exercises, or may exercise, control over the enterprise appears, has within the last five years been convicted of fraud or corruption;
- iv) confirms that I / we are not associated, linked or involved with any other tendering entities submitting tender offers and have no other relationship with any of the tenderers or those responsible for compiling the scope of work that could cause or be interpreted as a conflict of interest; and
- v) confirms that the contents of this questionnaire are within my personal knowledge and are to the best of my belief both true and correct.

Signed	Date
-----	-----
Name	Position
-----	-----
Enterprise name	

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SBD 6.1**PREFERENCE POINTS CLAIM FORM**

This preference form must form part of all bids invited. It contains general information and serves as a claim for preference points for Specific Goals contribution. Transnet will award preference points to companies who provide valid proof of evidence as per the table of evidence in paragraph 4.1 below.

1. GENERAL CONDITIONS

1.1 The following preference point systems are applicable to all bids:

- the 80/20 system for requirements with a Rand value of up to R50 000 000 (all applicable taxes included); and
- the 90/10 system for requirements with a Rand value above R50 000 000 (all applicable taxes included).

1.2 The value of this bid is estimated to exceed R50 000 000 (all applicable taxes included) and therefore the 90/10 preference point system shall be applicable. Despite the stipulated preference point system, Transnet shall use the lowest acceptable bid to determine the applicable preference point system in a situation where all received acceptable bids are received outside the stated preference point system.

1.3 Preference points for this bid shall be awarded for:

- (a) Price;
- (b) B-BBEE Status Level of Contribution; and
- (c) Any other specific goal determined in the Transnet preferential procurement policy

1.4 The maximum points for this bid are allocated as follows:

	POINTS
PRICE	90
B-BBEE STATUS LEVEL OF CONTRIBUTION Level 1 or 2	5
Job Creation criteria	5
Total points for Price and B-BBEE must not exceed	100

1.5 Failure on the part of a bidder to submit proof of evidence required for any of the specific goals together with the bid will be interpreted to mean that preference points for that

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specific goal are not claimed.

- 1.6 The purchaser reserves the right to require of a bidder, either before a bid is adjudicated or at any time subsequently, to substantiate any claim in regard to preferences, in any manner required by the purchaser.

2. DEFINITIONS

- (a) **"all applicable taxes"** includes value-added tax, pay as you earn, income tax, unemployment insurance fund contributions and skills development levies;
- (b) **"B-BBEE"** means broad-based black economic empowerment as defined in section 1 of the Broad-Based Black Economic Empowerment Act;
- (c) **"B-BBEE status level of contributor"** means the B-BBEE status received by a measured entity based on its overall performance using the relevant scorecard contained in the Codes of Good Practice on Black Economic Empowerment, issued in terms of section 9(1) of the Broad-Based Black Economic Empowerment Act;
- (d) **"bid"** means a written offer in a prescribed or stipulated form in response to an invitation by an organ of state for the supply/provision of services, works or goods, through price quotations, advertised competitive bidding processes or proposals;
- (e) **"Broad-Based Black Economic Empowerment Act"** means the Broad-Based Black Economic Empowerment Act, 2003 (Act No. 53 of 2003);
- (f) **"EME"** means an Exempted Micro Enterprise as defines by Codes of Good Practice under section 9 (1) of the Broad-Based Black Economic Empowerment Act, 2003 (Act No. 53 of 2003);
- (g) **"functionality"** means the ability of a bidder to provide goods or services in accordance with specification as set out in the bid documents
- (h) **"Price"** includes all applicable taxes less all unconditional discounts.
- (i) **"Proof of B-BBEE Status Level of Contributor"**
 - i) the B-BBBEE status level certificate issued by an authorised body or person;
 - ii) a sworn affidavit as prescribed by the B-BBEE Codes of Good Practice; or
 - iii) any other requirement prescribed in terms of the B-BBEE Act.
- (j) **"QSE"** means a Qualifying Small Enterprise as defines by Codes of Good Practice under section 9 (1) of the Broad-Based Black Economic Empowerment Act, 2003 (Act No. 53 of 2003);
- (k) **"rand value"** means the total estimated value of a contract in South African currency, calculated at the time of bid invitations, and includes all applicable taxes and excise duties.
- (l) **"Specific goals"** means targeted advancement areas or categories of persons or groups either previously disadvantaged or falling within the scope of the Reconstruction and

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Development Programme identified by Transnet to be given preference in allocation of procurement contracts in line with section 2(1) of the PPPFA.

3. POINTS AWARDED FOR PRICE

3.1 THE 90/10 PREFERENCE POINT SYSTEMS

A maximum of 90 points is allocated for price on the following basis:

$$P_s = 90 \left(1 - \frac{P_t - P_{\min}}{P_{\min}} \right)$$

Where

P_s = Points scored for comparative price of bid under consideration

P_t = Comparative price of bid under consideration

$P_{\min}$ = Comparative price of lowest acceptable bid

4. EVIDENCE REQUIRED FOR CLAIMING SPECIFIC GOALS

4.1 In terms of Transnet Preferential Procurement Policy (TPPP) and Procurement Manuals, preference points must be awarded to a bidder for providing evidence in accordance with the table below::

Specific Goals	Acceptable Evidence
B-BBEE Status contributor	B-BBEE Certificate / Sworn- Affidavit / B-BBEE CIPC Certificate (in case of JV, a consolidated scorecard will be accepted) as per DTIC guideline
Creation of new jobs and labour intensification	Section T2.2-09 Job Creation Schedule Returnable documents

4.2 The table below indicates the required proof of B-BBEE status depending on the category of enterprises:

Enterprise	B-BBEE Certificate & Sworn Affidavit
Large	Certificate issued by SANAS accredited verification agency
QSE	Certificate issued by SANAS accredited verification agency Sworn Affidavit signed by the authorised QSE representative and attested by a Commissioner of Oaths confirming annual turnover and black ownership (only black-owned QSEs - 51% to 100% Black owned)

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	[Sworn affidavits must substantially comply with the format that can be obtained on the DTI's website at www.dti.gov.za/economic_empowerment/bee_codes.jsp .]
EME	Sworn Affidavit signed by the authorised EME representative and attested by a Commissioner of Oaths confirming annual turnover and black ownership Certificate issued by CIPC (formerly CIPRO) confirming annual turnover and black ownership Certificate issued by SANAS accredited verification agency only if the EME is being measured on the QSE scorecard

- 4.3 A trust, consortium or joint venture (including unincorporated consortia and joint ventures) must submit a consolidated B-BBEE Status Level verification certificate for every separate bid.
- 4.4 Tertiary Institutions and Public Entities will be required to submit their B-BBEE status level certificates in terms of the specialized scorecard contained in the B-BBEE Codes of Good Practice.
- 4.5 Bidders are to note that the rules pertaining to B-BBEE verification and other B-BBEE requirements may be changed from time to time by regulatory bodies such as National Treasury or the DTI. It is the Bidder's responsibility to ensure that his/her bid complies fully with all B-BBEE requirements at the time of the submission of the bid.

5. BID DECLARATION

- 5.1 Bidders who claim points in respect of B-BBEE Status Level of Contribution must complete the following:

6. B-BBEE STATUS LEVEL OF CONTRIBUTION CLAIMED IN TERMS OF PARAGRAPHS 1.4 AND 6.1

- 6.1 B-BBEE Status Level of Contribution and other specific goals: =(maximum of 10 points)

(Points claimed in respect of paragraph 6.1 must be in accordance with the table reflected in paragraph 4.1 and must be substantiated by relevant proof of B-BBEE status level of contributor.

7. SUB-CONTRACTING

- 7.1 Will any portion of the contract be sub-contracted?

(*Tick applicable box*)

YES		NO	
-----	--	----	--

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7.1.1 If yes, indicate:

- i) What percentage of the contract will be subcontracted.....%
- ii) The name of the sub-contractor.....
- iii) The B-BBEE status level of the sub-contractor.....
- iv) Whether the sub-contractor is an EME or QSE.

(Tick applicable box)

YES		NO	
-----	--	----	--

8. DECLARATION WITH REGARD TO COMPANY/FIRM

- 8.1 Name of company/firm:.....
- 8.2 VAT registration number:.....
- 8.3 Company registration number:.....
- 8.4 TYPE OF COMPANY/ FIRM
 - ☐ Partnership/Joint Venture / Consortium
 - ☐ One person business/sole propriety
 - ☐ Close corporation
 - ☐ Company
 - ☐ (Pty) Limited

[TICK APPLICABLE BOX]

8.5 DESCRIBE PRINCIPAL BUSINESS ACTIVITIES

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8.6 COMPANY CLASSIFICATION

- ☐ Manufacturer
- ☐ Supplier
- ☐ Professional Supplier/Service provider
- ☐ Other Suppliers/Service providers, e.g. transporter, etc.

[*TICK APPLICABLE BOX*]

8.7 Total number of years the company/firm has been in business:.....

8.8 I/we, the undersigned, who is / are duly authorised to do so on behalf of the company/firm, certify that the points claimed, based on the B-BBE status level of contribution indicated in paragraphs 1.4 and 6.1 of the foregoing certificate, qualifies the company/ firm for the preference(s) shown and I / we acknowledge that:

- i) The information furnished is true and correct;
- ii) The preference points claimed are in accordance with the General Conditions as indicated in paragraph 1 of this form;
- iii) In the event of a contract being awarded as a result of points claimed as shown in paragraph 1.4 and 6.1, the contractor may be required to furnish documentary proof to the satisfaction of the purchaser that the claims are correct;
- iv) If a bidder submitted false information regarding its B-BBEE status level of contributor,, which will affect or has affected the evaluation of a bid, or where a bidder has failed to declare any subcontracting arrangements or any of the conditions of contract have not been fulfilled, the purchaser may, in addition to any other remedy it may have
 - (a) disqualify the person from the bidding process;
 - (b) recover costs, losses or damages it has incurred or suffered as a result of that person's conduct;
 - (c) cancel the contract and claim any damages which it has suffered as a result of having to make less favourable arrangements due to such cancellation;
 - (d) if the successful bidder subcontracted a portion of the bid to another person without disclosing it, Transnet reserves the right to penalise the bidder up to 10 percent of the value of the contract;
 - (e) recommend that the bidder or contractor, its shareholders and directors, or only the shareholders and directors who acted on a fraudulent basis,

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be restricted by the National Treasury from obtaining business from any organ of state for a period not exceeding 10 years, after the audi alteram partem (hear the other side) rule has been applied; and

(f) forward the matter for criminal prosecution.

WITNESSES

1.

2.

.....

SIGNATURE(S) OF BIDDERS(S)

DATE:

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BIDDER'S DISCLOSURE

1. PURPOSE OF THE FORM

Any person (natural or juristic) may make an offer or offers in terms of this invitation to bid. In line with the principles of transparency, accountability, impartiality, and ethics as enshrined in the Constitution of the Republic of South Africa and further expressed in various pieces of legislation, it is required for the bidder to make this declaration in respect of the details required hereunder.

Where a person/s are listed in the Register for Tender Defaulters and / or the List of Restricted Suppliers, that person will automatically be disqualified from the bid process.

2. Bidder's declaration

- 2.1 Is the bidder, or any of its directors / trustees / shareholders / members / partners or any person having a controlling interest¹ in the enterprise,

employed by the state?

YES/NO

- 2.1.1 If so, furnish particulars of the names, individual identity numbers, and, if applicable, state employee numbers of sole proprietor/ directors / trustees / shareholders / members/ partners or any person having a controlling interest in the enterprise, in table below.

Full Name	Identity Number	Name of State institution

- 2.2 Do you, or any person connected with the bidder, have a relationship with any person who is

¹ the power, by one person or a group of persons holding the majority of the equity of an enterprise, alternatively, the person/s having the deciding vote or power to influence or to direct the course and decisions of the enterprise.

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employed by the procuring institution? **YES/NO**

2.2.1 If so, furnish particulars:

.....

2.3 Does the bidder or any of its directors / trustees / shareholders / members / partners or any person having a controlling interest in the enterprise have any interest in any other related enterprise whether or not they are bidding for this contract?

YES/NO

2.3.1 If so, furnish particulars:

.....

3 DECLARATION

I, the undersigned, (name)..... in submitting the accompanying bid, do hereby make the following statements that I certify to be true and complete in every respect:

- 3.1 I have read and I understand the contents of this disclosure;
- 3.2 I understand that the accompanying bid will be disqualified if this disclosure is found not to be true and complete in every respect;
- 3.3 The bidder has arrived at the accompanying bid independently from, and without consultation, communication, agreement or arrangement with any competitor. However, communication between partners in a joint venture or consortium² will not be construed as collusive bidding.
- 3.4 In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications, prices, including methods, factors or formulas used to calculate prices, market allocation, the intention or decision to submit or not to submit the bid, bidding with the intention not to win the bid and conditions or delivery particulars of the products or services to which this bid invitation relates.
- 3.4 The terms of the accompanying bid have not been, and will not be, disclosed by the bidder, directly or indirectly, to any competitor, prior to the date and time of the official bid opening or of the awarding of the contract.
- 3.5 There have been no consultations, communications, agreements or arrangements made by the bidder with any official of the procuring institution in relation to this procurement process prior to and during the bidding process except to provide clarification on the bid submitted where so required by the institution; and the bidder was not involved in the drafting of the

² Joint venture or Consortium means an association of persons for the purpose of combining their expertise, property, capital, efforts, skill and knowledge in an activity for the execution of a contract.

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specifications or terms of reference for this bid.

- 3.6 I am aware that, in addition and without prejudice to any other remedy provided to combat any restrictive practices related to bids and contracts, bids that are suspicious will be reported to the Competition Commission for investigation and possible imposition of administrative penalties in terms of section 59 of the Competition Act No 89 of 1998 and or may be reported to the National Prosecuting Authority (NPA) for criminal investigation and or may be restricted from conducting business with the public sector for a period not exceeding ten (10) years in terms of the Prevention and Combating of Corrupt Activities Act No 12 of 2004 or any other applicable legislation.

I CERTIFY THAT THE INFORMATION FURNISHED IN PARAGRAPHS 1, 2 and 3 ABOVE IS CORRECT.

I ACCEPT THAT THE STATE MAY REJECT THE BID OR ACT AGAINST ME IN TERMS OF PARAGRAPH 6 OF PFMA SCM INSTRUCTION 03 OF 2021/22 ON PREVENTING AND COMBATING ABUSE IN THE SUPPLY CHAIN MANAGEMENT SYSTEM SHOULD THIS DECLARATION PROVE TO BE FALSE.

.....

Signature

.....

Date

.....

Position

.....

Name of bidder

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T2.2-14: JOB-CREATION SCHEDULE

The Government has identified State Owned Enterprises sourcing activities as a key enabler to achieve the National Development Plan (NDP) objective of reducing unemployment from the current baseline of 28% to 6%.

In order to give effect to these job creation objectives, Tenderers are required to provide the following undertaking of new jobs that will be created (either by them or by their subcontractors) should they be awarded this tender.

Tenderers to note, that if successful, any deviations from the Job creation Schedule in the contract phase will be subject to acceptance by the *Project Manager* in terms of the Conditions of Contract. Please also note the applicable Z clauses in Contract Data by Employer.

- (a) Please indicate total number of new jobs that will be created over the term of the contract:

Total number and value of new jobs created	Total number of new jobs	Total rand value of new jobs created

- (b) Of the total number of new jobs created, please indicate the number and value of new jobs to be created for the following designated groups:

	Total number of new jobs	Total rand value of new jobs
Black men		
Black women		
Black Youth		
Black people living in rural or underdeveloped areas or townships		
Black People with Disabilities		

- (c) Of the total number of new jobs created, please indicate the number of skilled, semi-skilled and unskilled new jobs that will be created over the term of the contract:

	Total number of Skilled jobs	Total number of Semi-skilled jobs	Total number of Unskilled jobs
Black men			
Black women			
Black Youth			

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Black people living in rural or underdeveloped areas or townships			
Black People with Disabilities			
Other			

(d) Please indicate the number of new jobs to be created, broken down per quarter over the term of the contract.

Year 1	Q1	Q2	Q3	Q4
Total number of new jobs				
Number of new jobs for Black men				
Number of new jobs for black women				
Number of new jobs for black youth				
Number of new jobs for black people living in rural or underdeveloped areas or townships				
Number of new jobs for black People with Disabilities				
Number of new jobs for other categories				
Number of new skilled jobs				
Number of new semi-skilled jobs				
Number of new unskilled jobs				
Year 2	Q1	Q2	Q3	Q4
Total number of new jobs				
Number of new jobs for Black men				
Number of new jobs for black women				
Number of new jobs for black youth				
Number of new jobs for black people living in rural or underdeveloped areas or townships				
Number of new jobs for black People with Disabilities				
Number of new jobs for other categories				

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Number of new skilled jobs				
Number of new semi-skilled jobs				
Number of new unskilled jobs				
Year 3	Q1	Q2	Q3	Q4
Total number of new jobs				
Number of new jobs for Black men				
Number of new jobs for black women				
Number of new jobs for black youth				
Number of new jobs for black people living in rural or underdeveloped areas or townships				
Number of new jobs for black People with Disabilities				
Number of new jobs for other categories				
Number of new skilled jobs				
Number of new semi-skilled jobs				
Number of new unskilled jobs				
Year 4	Q1	Q2	Q3	Q4
Total number of new jobs				
Number of new jobs for Black men				
Number of new jobs for black women				
Number of new jobs for black youth				
Number of new jobs for black people living in rural or underdeveloped areas or townships				
Number of new jobs for black People with Disabilities				
Number of new jobs for other categories				
Number of new skilled jobs				
Number of new semi-skilled jobs				
Number of new unskilled jobs				
Year 5	Q1	Q2	Q3	Q4

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Total number of new jobs				
Number of new jobs for Black men				
Number of new jobs for black women				
Number of new jobs for black youth				
Number of new jobs for black people living in rural or underdeveloped areas or townships				
Number of new jobs for black People with Disabilities				
Number of new jobs for other categories				
Number of new skilled jobs				
Number of new semi-skilled jobs				
Number of new unskilled jobs				
Year 6	Q1	Q2	Q3	Q4
Total number of new jobs				
Number of new jobs for Black men				
Number of new jobs for black women				
Number of new jobs for black youth				
Number of new jobs for black people living in rural or underdeveloped areas or townships				
Number of new jobs for black People with Disabilities				
Number of new jobs for other categories				
Number of new skilled jobs				
Number of new semi-skilled jobs				
Number of new unskilled jobs				

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T2.2-15: NON-DISCLOSURE AGREEMENT

Note to tenderers: This Non-Disclosure Agreement is to be completed and signed by an authorised signatory:

THIS AGREEMENT is made effective as of day of 20..... by and between:

TRANSNET SOC LTD

(Registration No. 1990/000900/30), a company incorporated and existing under the laws of South Africa, having its principal place of business at Transnet Corporate Centre 138 Eloff Street , Braamfontein , Johannesburg 2000

and

.....
(Registration No.), a private company incorporated and existing under the laws of South Africa having its principal place of business at
.....
.....

WHEREAS

Transnet and the Company wish to exchange Information [as defined below] and it is envisaged that each party may from time to time receive Information relating to the other in respect thereof. In consideration of each party making available to the other such Information, the parties jointly agree that any dealings between them shall be subject to the terms and conditions of this Agreement which themselves will be subject to the parameters of the Tender Document.

IT IS HEREBY AGREED

1. INTERPRETATION

In this Agreement:

- 1.1 **Agents** mean directors, officers, employees, agents, professional advisers, contractors or sub-contractors, or any Group member;
- 1.2 **Bid or Bid Document** (hereinafter Tender) means Transnet's Request for Information [**RFI**] Request for Proposal [**RFP**] or Request for Quotation [**RFQ**], as the case may be;
- 1.3 **Confidential Information** means any information or other data relating to one party [the **Disclosing Party**] and/or the business carried on or proposed or intended to be carried on by that party and which is made available for the purposes of the Bid to the other party [the **Receiving Party**] or its Agents by the Disclosing Party or its Agents or recorded in agreed minutes following oral disclosure and any other information otherwise

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made available by the Disclosing Party or its Agents to the Receiving Party or its Agents, whether before, on or after the date of this Agreement, and whether in writing or otherwise, including any information, analysis or specifications derived from, containing or reflecting such information but excluding information which:

- 1.3.1 is publicly available at the time of its disclosure or becomes publicly available [other than as a result of disclosure by the Receiving Party or any of its Agents contrary to the terms of this Agreement]; or
- 1.3.2 was lawfully in the possession of the Receiving Party or its Agents [as can be demonstrated by its written records or other reasonable evidence] free of any restriction as to its use or disclosure prior to its being so disclosed; or
- 1.3.3 following such disclosure, becomes available to the Receiving Party or its Agents [as can be demonstrated by its written records or other reasonable evidence] from a source other than the Disclosing Party or its Agents, which source is not bound by any duty of confidentiality owed, directly or indirectly, to the Disclosing Party in relation to such information;
- 1.4 **Group** means any subsidiary, any holding company and any subsidiary of any holding company of either party; and
- 1.5 **Information** means all information in whatever form including, without limitation, any information relating to systems, operations, plans, intentions, market opportunities, know-how, trade secrets and business affairs whether in writing, conveyed orally or by machine-readable medium.

2. CONFIDENTIAL INFORMATION

- 2.1 All Confidential Information given by one party to this Agreement [the **Disclosing Party**] to the other party [the **Receiving Party**] will be treated by the Receiving Party as secret and confidential and will not, without the Disclosing Party's written consent, directly or indirectly communicate or disclose [whether in writing or orally or in any other manner] Confidential Information to any other person other than in accordance with the terms of this Agreement.
- 2.2 The Receiving Party will only use the Confidential Information for the sole purpose of technical and commercial discussions between the parties in relation to the Tender or for the subsequent performance of any contract between the parties in relation to the Tender.
- 2.3 Notwithstanding clause 2.1 above, the Receiving Party may disclose Confidential Information:
 - 2.3.1 to those of its Agents who strictly need to know the Confidential Information for the sole purpose set out in clause 2.2 above, provided that the Receiving Party shall ensure that such Agents are made aware prior to the disclosure of any part of the Confidential Information that the same is confidential and that they owe a duty of confidence to the Disclosing Party. The Receiving Party shall at all times remain liable for any actions of such Agents that would constitute a breach of this Agreement; or

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- 2.3.2 to the extent required by law or the rules of any applicable regulatory authority, subject to clause 2.4 below.
- 2.4 In the event that the Receiving Party is required to disclose any Confidential Information in accordance with clause 2.3.2 above, it shall promptly notify the Disclosing Party and cooperate with the Disclosing Party regarding the form, nature, content and purpose of such disclosure or any action which the Disclosing Party may reasonably take to challenge the validity of such requirement.
- 2.5 In the event that any Confidential Information shall be copied, disclosed or used otherwise than as permitted under this Agreement then, upon becoming aware of the same, without prejudice to any rights or remedies of the Disclosing Party, the Receiving Party shall as soon as practicable notify the Disclosing Party of such event and if requested take such steps [including the institution of legal proceedings] as shall be necessary to remedy [if capable of remedy] the default and/or to prevent further unauthorised copying, disclosure or use.
- 2.6 All Confidential Information shall remain the property of the Disclosing Party and its disclosure shall not confer on the Receiving Party any rights, including intellectual property rights over the Confidential Information whatsoever, beyond those contained in this Agreement.

3. RECORDS AND RETURN OF INFORMATION

- 3.1 The Receiving Party agrees to ensure proper and secure storage of all Information and any copies thereof.
- 3.2 The Receiving Party shall keep a written record, to be supplied to the Disclosing Party upon request, of the Confidential Information provided and any copies made thereof and, so far as is reasonably practicable, of the location of such Confidential Information and any copies thereof.
- 3.3 The Company shall, within 7 [seven] days of receipt of a written demand from Transnet:
- 3.3.1 return all written Confidential Information [including all copies]; and
- 3.3.2 expunge or destroy any Confidential Information from any computer, word processor or other device whatsoever into which it was copied, read or programmed by the Company or on its behalf.
- 3.4 The Company shall on request supply a certificate signed by a director as to its full compliance with the requirements of clause 3.3.2 above.

4. ANNOUNCEMENTS

- 4.1 Neither party will make or permit to be made any announcement or disclosure of its prospective interest in the Tender without the prior written consent of the other party.
- 4.2 Neither party shall make use of the other party's name or any information acquired through its dealings with the other party for publicity or marketing purposes without the prior written consent of the other party.

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5. DURATION

The obligations of each party and its Agents under this Agreement shall survive the termination of any discussions or negotiations between the parties regarding the Tender and continue thereafter for a period of 5 [five] years.

6. PRINCIPAL

Each party confirms that it is acting as principal and not as nominee, agent or broker for any other person and that it will be responsible for any costs incurred by it or its advisers in considering or pursuing the Tender and in complying with the terms of this Agreement.

7. ADEQUACY OF DAMAGES

Nothing contained in this Agreement shall be construed as prohibiting the Disclosing Party from pursuing any other remedies available to it, either at law or in equity, for any such threatened or actual breach of this Agreement, including specific performance, recovery of damages or otherwise.

8. PRIVACY AND DATA PROTECTION

- 8.1 The Receiving Party undertakes to comply with South Africa's general privacy protection in terms Section 14 of the Bill of Rights in connection with this Tender and shall procure that its personnel shall observe the provisions of such Act [as applicable] or any amendments and re-enactments thereof and any regulations made pursuant thereto.
- 8.2 The Receiving Party warrants that it and its Agents have the appropriate technical and organisational measures in place against unauthorised or unlawful processing of data relating to the Tender and against accidental loss or destruction of, or damage to such data held or processed by them.

9. GENERAL

- 9.1 Neither party may assign the benefit of this Agreement, or any interest hereunder, except with the prior written consent of the other, save that Transnet may assign this Agreement at any time to any member of the Transnet Group.
- 9.2 No failure or delay in exercising any right, power or privilege under this Agreement will operate as a waiver of it, nor will any single or partial exercise of it preclude any further exercise or the exercise of any right, power or privilege under this Agreement or otherwise.
- 9.3 The provisions of this Agreement shall be severable in the event that any of its provisions are held by a court of competent jurisdiction or other applicable authority to be invalid, void or otherwise unenforceable, and the remaining provisions shall remain enforceable to the fullest extent permitted by law.
- 9.4 This Agreement may only be modified by a written agreement duly signed by persons authorised on behalf of each party.
- 9.5 Nothing in this Agreement shall constitute the creation of a partnership, joint venture or agency between the parties.

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- 9.6 This Agreement will be governed by and construed in accordance with South African law and the parties irrevocably submit to the exclusive jurisdiction of the South African courts.

Signed

Date

Name

Position

Tenderer

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T2.2-16: RFP DECLARATION FORM

NAME OF COMPANY: _____

We _____ do hereby certify that:

1. Transnet has supplied and we have received appropriate tender offers to any/all questions (as applicable) which were submitted by ourselves for tender clarification purposes;
2. we have received all information we deemed necessary for the completion of this Tender;
3. at no stage have we received additional information relating to the subject matter of this tender from Transnet sources, other than information formally received from the designated Transnet contact(s) as nominated in the tender documents;
4. we are satisfied, insofar as our company is concerned, that the processes and procedures adopted by Transnet in issuing this tender and the requirements requested from tenderers in responding to this tender have been conducted in a fair and transparent manner; and
5. furthermore, we acknowledge that a direct relationship exists between a family member and/or an owner / member / director / partner / shareholder (unlisted companies) of our company and an employee or board member of the Transnet Group as indicated below:
[Respondent to indicate if this section is not applicable]

FULL NAME OF OWNER/MEMBER/DIRECTOR/

PARTNER/SHAREHOLDER:

ADDRESS:

Indicate nature of relationship with Transnet:

[Failure to furnish complete and accurate information in this regard may lead to the disqualification of your response and may preclude a Respondent from doing future business with Transnet]

We declare, to the extent that we are aware or become aware of any relationship between ourselves and Transnet (other than any existing and appropriate business relationship with

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Transnet) which could unfairly advantage our company in the forthcoming adjudication process, we shall notify Transnet immediately in writing of such circumstances.

6. We accept that any dispute pertaining to this tender will be resolved through the Ombudsman process and will be subject to the Terms of Reference of the Ombudsman. The Ombudsman process must first be exhausted before judicial review of a decision is sought. (Refer "Important Notice to respondents" below).
7. We further accept that Transnet reserves the right to reverse a tender award or decision based on the recommendations of the Ombudsman without having to follow a formal court process to have such award or decision set aside.
8. We have acquainted ourselves and agree with the content of T2.2-13 "Service Provider Integrity Pact".

For and on behalf of duly authorised thereto
Name:
Signature:
Date:

IMPORTANT NOTICE TO TENDERERS

- Transnet has appointed a Procurement Ombudsman to investigate any material complaint in respect of tenders exceeding R5,000,000.00 (five million S.A. Rand) in value. Should a Tenderer have any material concern regarding an tender process which meets this value threshold, a complaint may be lodged with Transnet's Procurement Ombudsman for further investigation.
- It is incumbent on the Tenderer to familiarise himself/herself with the Terms of Reference for the Transnet Procurement Ombudsman, details of which are available for review at Transnet's website www.transnet.net.
- An official complaint form may be downloaded from this website and submitted, together with any supporting documentation, within the prescribed period, to procurement.ombud@transnet.net
- For transactions below the R5,000,000.00 (five million S.A. Rand) threshold, a complaint may be lodged with the Chief Procurement Officer of the relevant Transnet Operating Division.

TENDER NUMBER: **TPL/2024/06/0005/68787/RFP**

DESCRIPTION OF THE WORKS: FOR THE PROVISION OF DESIGN, ENGINEERING, SUPPLY, PROCUREMENT, FABRICATION, SOFTWARE DEVELOPMENT, TESTING, INSTALLATION, COMMISSIONING AND HANDOVER OF PROCESS CONTROL, INTEGRATED CUSTODY METERING AND PIPELINE MONITORING SYSTEMS TO ALL TRANSNET PIPELINES INLAND STATIONS, MASTER, AND SECONDARY CONTROL CENTRES – **MAIN AUTOMATION CONTRACT.**

- All Tenderers should note that a complaint must be made in good faith. If a complaint is made in bad faith, Transnet reserves the right to place such a tenderer on its List of Excluded Bidders.

TENDER NUMBER: **TPL/2024/06/0005/68787/RFP**

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T2.2-17: REQUEST FOR PROPOSAL – BREACH OF LAW

NAME OF COMPANY: _____

I / We _____ do hereby certify that ***I/we have/have not been*** found guilty during the preceding 5 (five) years of a serious breach of law, including but not limited to a breach of the Competition Act, 89 of 1998, by a court of law, tribunal or other administrative body. The type of breach that the Tenderer is required to disclose excludes relatively minor offences or misdemeanours, e.g. traffic offences.

Where found guilty of such a serious breach, please disclose:

NATURE OF BREACH:

DATE OF BREACH: _____

Furthermore, I/we acknowledge that Transnet SOC Ltd reserves the right to exclude any Tenderer from the tendering process, should that person or company have been found guilty of a serious breach of law, tribunal or regulatory obligation.

Signed on this _____ day of _____ 20____

SIGNATURE OF TENDERER

DESCRIPTION OF THE WORKS: FOR THE PROVISION OF DESIGN, ENGINEERING, SUPPLY, PROCUREMENT, FABRICATION, SOFTWARE DEVELOPMENT, TESTING, INSTALLATION, COMMISSIONING AND HANDOVER OF PROCESS CONTROL, INTEGRATED CUSTODY METERING AND PIPELINE MONITORING SYSTEMS TO ALL TRANSNET PIPELINES INLAND STATIONS, MASTER, AND SECONDARY CONTROL CENTRES – **MAIN AUTOMATION CONTRACT.**

T2.2-18: Certificate of Acquaintance with Tender Documents

NAME OF TENDERING ENTITY:

1. By signing this certificate I/we acknowledge that I/we have made myself/ourselves thoroughly familiar with, and agree with all the conditions governing this RFP. This includes those terms and conditions of the Contract, the Supplier Integrity Pact, Non-Disclosure Agreement etc. contained in any printed form stated to form part of the documents thereof, but not limited to those listed in this clause.
2. I/we furthermore agree that Transnet SOC Ltd shall recognise no claim from me/us for relief based on an allegation that I/we overlooked any tender/contract condition or failed to take it into account for the purpose of calculating my/our offered prices or otherwise.
3. I/we understand that the accompanying Tender will be disqualified if this Certificate is found not to be true and complete in every respect.
4. For the purposes of this Certificate and the accompanying Tender, I/we understand that the word "competitor" shall include any individual or organisation, other than the Tenderer, whether or not affiliated with the Tenderer, who:
 - a) has been requested to submit a Tender in response to this Tender invitation;
 - b) could potentially submit a Tender in response to this Tender invitation, based on their qualifications, abilities or experience; and
 - c) provides the same Services as the Tenderer and/or is in the same line of business as the Tenderer
5. The Tenderer has arrived at the accompanying Tender independently from, and without consultation, communication, agreement or arrangement with any competitor. However communication between partners in a joint venture or consortium will not be construed as collusive Tendering.
6. In particular, without limiting the generality of paragraph 5 above, there has been no consultation, communication, agreement or arrangement with any competitor regarding:
 - a) prices;
 - b) geographical area where Services will be rendered [market allocation]
 - c) methods, factors or formulas used to calculate prices;
 - d) the intention or decision to submit or not to submit, a Tender;
 - e) the submission of a tender which does not meet the specifications and conditions of the tender; or
 - f) Tendering with the intention not winning the tender.

TENDER NUMBER: **TPL/2024/06/0005/68787/RFP**

DESCRIPTION OF THE WORKS: FOR THE PROVISION OF DESIGN, ENGINEERING, SUPPLY, PROCUREMENT, FABRICATION, SOFTWARE DEVELOPMENT, TESTING, INSTALLATION, COMMISSIONING AND HANDOVER OF PROCESS CONTROL, INTEGRATED CUSTODY METERING AND PIPELINE MONITORING SYSTEMS TO ALL TRANSNET PIPELINES INLAND STATIONS, MASTER, AND SECONDARY CONTROL CENTRES – **MAIN AUTOMATION CONTRACT.**

7. In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications and conditions or delivery particulars of the Services to which this tender relates.
8. The terms of the accompanying tender have not been, and will not be, 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.
9. I/We am/are aware that, in addition and without prejudice to any other remedy provided to combat any restrictive practices related to tenders and contracts, tenders that are suspicious will be reported to the Competition Commission for investigation and possible imposition of administrative penalties in terms of section 59 of the Competition Act No 89 of 1998 and/or may be reported to the National Prosecuting Authority [NPA] for criminal investigation. In addition, Tenderers that submit suspicious tenders may be restricted from conducting business with the public sector for a period not exceeding 10 [ten] years in terms of the Prevention and Combating of Corrupt Activities Act No 12 of 2004 or any other applicable legislation.

Signed on this _____ day of _____ 20____

SIGNATURE OF TENDERER

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T2.2-19: Service Provider Integrity Pact

Important Note: All potential tenderers must read this document and certify in the RFP Declaration Form that they have acquainted themselves with, and agree with the content.

The contract with the successful tenderer will automatically incorporate this Integrity Pact and shall be deemed as part of the final concluded contract.

INTEGRITY PACT

Between

TRANSNET SOC LTD

Registration Number: 1990/000900/30

("Transnet")

and

The Contractor (hereinafter referred to as the "Tenderer/Service Providers/Contractor")

PREAMBLE

Transnet values full compliance with all relevant laws and regulations, ethical standards and the principles of economical use of resources, fairness and transparency in its relations with its Tenderers/Service Providers/Contractors.

In order to achieve these goals, Transnet and the Tenderer/Service Provider/Contractor hereby enter into this agreement hereinafter referred to as the "Integrity Pact" which will form part of the Tenderer's/Service Provider's/Contractor's application for registration with Transnet as a vendor.

The general purpose of this Integrity Pact is to agree on avoiding all forms of dishonesty, fraud and corruption by following a system that is fair, transparent and free from any undue influence prior to, during and subsequent to the currency of any procurement and/or reverse logistics event and any further contract to be entered into between the Parties, relating to such event.

All Tenderers/Service Providers/Contractor's will be required to sign and comply with undertakings contained in this Integrity Pact, should they want to be registered as a Transnet vendor.

1 OBJECTIVES

DESCRIPTION OF THE WORKS: FOR THE PROVISION OF DESIGN, ENGINEERING, SUPPLY, PROCUREMENT, FABRICATION, SOFTWARE DEVELOPMENT, TESTING, INSTALLATION, COMMISSIONING AND HANDOVER OF PROCESS CONTROL, INTEGRATED CUSTODY METERING AND PIPELINE MONITORING SYSTEMS TO ALL TRANSNET PIPELINES INLAND STATIONS, MASTER, AND SECONDARY CONTROL CENTRES – **MAIN AUTOMATION CONTRACT.**

1.1 Transnet and the Tenderer/Service Provider/Contractor agree to enter into this Integrity Pact, to avoid all forms of dishonesty, fraud and corruption including practices that are anti-competitive in nature, negotiations made in bad faith and under-pricing by following a system that is fair, transparent and free from any influence/unprejudiced dealings prior to, during and subsequent to the currency of the contract to be entered into with a view to:

- a) Enable Transnet to obtain the desired contract at a reasonable and competitive price in conformity to the defined specifications of the works, goods and services; and
- b) Enable Tenderers/Service Providers/Contractors to abstain from bribing or participating in any corrupt practice in order to secure the contract.

2 COMMITMENTS OF TRANSNET

Transnet commits to take all measures necessary to prevent dishonesty, fraud and corruption and to observe the following principles:

2.1 Transnet hereby undertakes that no employee of Transnet connected directly or indirectly with the sourcing event and ensuing contract, will demand, take a promise for or accept directly or through intermediaries any bribe, consideration, gift, reward, favour or any material or immaterial benefit or any other advantage from the Tenderer, either for themselves or for any person, organisation or third party related to the contract in exchange for an advantage in the tendering process, Tender evaluation, contracting or implementation process related to any contract.

2.2 Transnet will, during the registration and tendering process treat all Tenderers/ Service Providers/Contractor with equity, transparency and fairness. Transnet will in particular, before and during the registration process, provide to all Tenderers/ Service Providers/Contractors the same information and will not provide to any Tenderers/Service Providers/Contractors confidential/additional information through which the Tenderers/Service Providers/Contractors could obtain an advantage in relation to any tendering process.

2.3 Transnet further confirms that its employees will not favour any prospective Tenderers/Service Providers/Contractors in any form that could afford an undue advantage to a particular Tenderer during the tendering stage, and will further treat all Tenderers/Service Providers/Contractors participating in the tendering process in a fair manner.

2.4 Transnet will exclude from the tender process such employees who have any personal interest in the Tenderers/Service Providers/Contractors participating in the tendering process.

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3 OBLIGATIONS OF THE TENDERER / SERVICE PROVIDER

3.1 Transnet has a '**Zero Gifts**' Policy. No employee is allowed to accept gifts, favours or benefits.

a) Transnet officials and employees **shall not** solicit, give or accept, or from agreeing to solicit, give, accept or receive directly or indirectly, any gift, gratuity, favour, entertainment, loan, or anything of monetary value, from any person or juridical entities in the course of official duties or in connection with any operation being managed by, or any transaction which may be affected by the functions of their office.

b) Transnet officials and employees **shall not** solicit or accept gifts of any kind, from vendors, suppliers, customers, potential employees, potential vendors, and suppliers, or any other individual or organisation irrespective of the value.

c) Under **no circumstances** should gifts, business courtesies or hospitality packages be accepted from or given to prospective suppliers participating in a tender process at the respective employee's Operating Division, regardless of retail value.

d) Gratuities, bribes or kickbacks of any kind must never be solicited, accepted or offered, either directly or indirectly. This includes money, loans, equity, special privileges, personal favours, benefit or services. Such favours will be considered to constitute corruption.

3.2 The Tenderer/Service Provider/Contractor commits itself to take all measures necessary to prevent corrupt practices, unfair means and illegal activities during any stage of its Tender or during any ensuing contract stage in order to secure the contract or in furtherance to secure it and in particular the Tenderer/Service Provider/Contractor commits to the following:

a) The Tenderer/Service Provider/Contractor will not, directly or through any other person or firm, offer, promise or give to Transnet or to any of Transnet's employees involved in the tendering process or to any third person any material or other benefit or payment, in order to obtain in exchange an advantage during the tendering process; and

b) The Tenderer/Service Provider/Contractor will not offer, directly or through intermediaries, any bribe, gift, consideration, reward, favour, any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any employee of Transnet, connected directly or indirectly with the tendering process, or to any person, organisation or third party related to the contract in exchange for any advantage in the tendering, evaluation, contracting and implementation of the contract.

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3.3 The Tenderer/Service Provider/Contractor will not collude with other parties interested in the contract to preclude a competitive Tender price, impair the transparency, fairness and progress of the tendering process, Tender evaluation, contracting and implementation of the contract. The Tenderer / Service Provider further commits itself to delivering against all agreed upon conditions as stipulated within the contract.

3.4 The Tenderer/Service Provider/Contractor will not enter into any illegal or dishonest agreement or understanding, whether formal or informal with other Tenderers/Service Providers/Contractors. This applies in particular to certifications, submissions or non-submission of documents or actions that are restrictive or to introduce cartels into the tendering process.

3.5 The Tenderer/Service Provider/Contractor will not commit any criminal offence under the relevant anti-corruption laws of South Africa or any other country. Furthermore, the Tenderer/Service Provider/Contractor will not use for illegitimate purposes or for restrictive purposes or personal gain, or pass on to others, any information provided by Transnet as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

3.6 A Tenderer/Service Provider/Contractor of foreign origin shall disclose the name and address of its agents or representatives in South Africa, if any, involved directly or indirectly in the registration or tendering process. Similarly, the Tenderer / Service Provider / Contractor of South African nationality shall furnish the name and address of the foreign principals, if any, involved directly or indirectly in the registration or tendering process.

3.7 The Tenderer/Service Provider/Contractor will not misrepresent facts or furnish false or forged documents or information in order to influence the tendering process to the advantage of the Tenderer/Service Provider/Contractor or detriment of Transnet or other competitors.

3.8 Transnet may require the Tenderer/Service Provider/Contractor to furnish Transnet with a copy of its code of conduct. Such code of conduct must address the compliance programme for the implementation of the code of conduct and reject the use of bribes and other dishonest and unethical conduct.

3.9 The Tenderer/Service Provider/Contractor will not instigate third persons to commit offences outlined above or be an accessory to such offences.

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3.10 The Tenderer/Service Provider/Contractor confirms that they will uphold the ten principles of the United Nations Global Compact (UNGC) in the fields of Human Rights, Labour, Anti-Corruption and the Environment when undertaking business with Transnet as follows:

a) Human Rights

- Principle 1: Businesses should support and respect the protection of internationally proclaimed human rights; and
- Principle 2: make sure that they are not complicit in human rights abuses.

b) Labour

- Principle 3: Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;
- Principle 4: the elimination of all forms of forced and compulsory labour;
- Principle 5: the effective abolition of child labour; and
- Principle 6: the elimination of discrimination in respect of employment and occupation.

c) Environment

- Principle 7: Businesses should support a precautionary approach to environmental challenges;
- Principle 8: undertake initiatives to promote greater environmental responsibility; and
- Principle 9: encourage the development and diffusion of environmentally friendly technologies.

d) Anti-Corruption

- Principle 10: Businesses should work against corruption in all its forms, including extortion and bribery.

4 **INDEPENDENT TENDERING**

4.1 For the purposes of that Certificate in relation to any submitted Tender, the Tenderer declares to fully understand that the word "competitor" shall include any individual or organisation, other than the Tenderer, whether or not affiliated with the Tenderer, who:

- a) has been requested to submit a Tender in response to this Tender invitation;
- b) could potentially submit a Tender in response to this Tender invitation, based on their qualifications, abilities or experience; and

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c) provides the same Goods and Services as the Tenderer and/or is in the same line of business as the Tenderer.

4.2 The Tenderer has arrived at his submitted Tender independently from, and without consultation, communication, agreement or arrangement with any competitor. However communication between partners in a joint venture or consortium will not be construed as collusive tendering.

4.3 In particular, without limiting the generality of paragraph 5 above, there has been no consultation, communication, agreement or arrangement with any competitor regarding:

- a) prices;
- b) geographical area where Goods or Services will be rendered [market allocation];
- c) methods, factors or formulas used to calculate prices;
- d) the intention or decision to submit or not to submit, a Tender;
- e) the submission of a Tender which does not meet the specifications and conditions of the RFP;
or
- f) tendering with the intention of not winning the Tender.

4.4 In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications and conditions or delivery particulars of the Goods or Services to which his/her tender relates.

4.5 The terms of the Tender as submitted have not been, and will not be, 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.

4.6 Tenderers are aware that, in addition and without prejudice to any other remedy provided to combat any restrictive practices related to Tenders and contracts, Tenders that are suspicious will be reported to the Competition Commission for investigation and possible imposition of administrative penalties in terms of section 59 of the Competition Act No 89 of 1998 and/or may be reported to the National Prosecuting Authority [**NPA**] for criminal investigation and/or may be restricted from conducting business with the public sector for a period not exceeding 10 [ten] years in terms of the Prevention and Combating of Corrupt Activities Act No 12 of 2004 or any other applicable legislation.

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4.7 Should the Tenderer find any terms or conditions stipulated in any of the relevant documents quoted in the Tender unacceptable, it should indicate which conditions are unacceptable and offer alternatives by written submission on its company letterhead, attached to its submitted Tender. Any such submission shall be subject to review by Transnet's Legal Counsel who shall determine whether the proposed alternative(s) are acceptable or otherwise, as the case may be.

5 DISQUALIFICATION FROM TENDERING PROCESS

5.1 If the Tenderer/Service Provider/Contractor has committed a transgression through a violation of section 3 of this Integrity Pact or in any other form such as to put its reliability or credibility as a Tenderer/Service Provider/Contractor into question, Transnet may reject the Tenderer's / Service Provider's / Contractor's application from the registration or tendering process and remove the Tenderer/Service Provider/Contractor from its database, if already registered.

5.2 If the Tenderer/Service Provider/Contractor has committed a transgression through a violation of section 3, or any material violation, such as to put its reliability or credibility into question. Transnet may after following due procedures and at its own discretion also exclude the Tenderer/Service Provider /Contractor from future tendering processes. The imposition and duration of the exclusion will be determined by the severity of the transgression. The severity will be determined by the circumstances of the case, which will include amongst others the number of transgressions, the position of the transgressors within the company hierarchy of the Tenderer/Service Provider/Contractor and the amount of the damage. The exclusion will be imposed for up to a maximum of 10 (ten) years. However, Transnet reserves the right to impose a longer period of exclusion, depending on the gravity of the misconduct.

5.3 If the Tenderer/Service Provider/Contractor can prove that it has restored the damage caused by it and has installed a suitable corruption prevention system, or taken other remedial measures as the circumstances of the case may require, Transnet may at its own discretion revoke the exclusion or suspend the imposed penalty.

6 TRANSNET'S LIST OF EXCLUDED TENDERERS (BLACKLIST)

6.1 The process of restriction is used to exclude a company/person from conducting future business with Transnet and other organs of state for a specified period. No Tender shall be awarded to a Tenderer whose name (or any of its members, directors, partners or trustees) appear on the Register of Tender Defaulters kept by National Treasury, or who have been placed on National Treasury's List of Restricted Suppliers. Transnet reserves the right to withdraw an award, or cancel a

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contract concluded with a Tenderer should it be established, at any time, that a tenderer has been restricted with National Treasury by another government institution.

6.2 All the stipulations on Transnet's restriction process as laid down in Transnet's Supply Chain Policy and Procurement Procedures Manual (CPM included) are included herein by way of reference. Below follows a condensed summary of this restriction procedure.

6.3 On completion of the restriction procedure, Transnet will submit the restricted entity's details (including the identity number of the individuals and registration number of the entity) to National Treasury for placement on National Treasury's Database of Restricted Suppliers for the specified period of exclusion. National Treasury will make the final decision on whether to restrict an entity from doing business with any organ of state for a period not exceeding 10 years and place the entity concerned on the Database of Restricted Suppliers published on its official website.

6.4 The decision to restrict is based on one of the grounds for restriction. The standard of proof to commence the restriction process is whether a "prima facie" (i.e. on the face of it) case has been established.

6.5 Depending on the seriousness of the misconduct and the strategic importance of the Goods/Services, in addition to restricting a company/person from future business, Transnet may decide to terminate some or all existing contracts with the company/person as well.

6.6 A Service Provider or Contractor to Transnet may not subcontract any portion of the contract to a blacklisted company.

6.7 Grounds for blacklisting include: If any person/Enterprise which has submitted a Tender, concluded a contract, or, in the capacity of agent or subcontractor, has been associated with such Tender or contract:

- a) Has, in bad faith, withdrawn such Tender after the advertised closing date and time for the receipt of Tenders;
- b) has, after being notified of the acceptance of his Tender, failed or refused to sign a contract when called upon to do so in terms of any condition forming part of the Tender documents;
- c) has carried out any contract resulting from such Tender in an unsatisfactory manner or has breached any condition of the contract;
- d) has offered, promised or given a bribe in relation to the obtaining or execution of the contract;

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- e) has acted in a fraudulent or improper manner or in bad faith towards Transnet or any Government Department or towards any public body, Enterprise or person;
- f) has made any incorrect statement in a certificate or other communication with regard to the Local Content of his Goods or his B-BBEE status and is unable to prove to the satisfaction of Transnet that:
 - (i) he made the statement in good faith honestly believing it to be correct; and
 - (ii) before making such statement he took all reasonable steps to satisfy himself of its correctness;
- g) caused Transnet damage, or to incur costs in order to meet the contractor's requirements and which could not be recovered from the contractor;
- h) has litigated against Transnet in bad faith.

6.8 Grounds for blacklisting include a company/person recorded as being a company or person prohibited from doing business with the public sector on National Treasury's database of Restricted Service Providers or Register of Tender Defaulters.

6.9 Companies associated with the person/s guilty of misconduct (i.e. entities owned, controlled or managed by such persons), any companies subsequently formed by the person(s) guilty of the misconduct and/or an existing company where such person(s) acquires a controlling stake may be considered for blacklisting. The decision to extend the blacklist to associated companies will be at the sole discretion of Transnet.

7 **PREVIOUS TRANSGRESSIONS**

7.1 The Tenderer/Service Provider/Contractor hereby declares that no previous transgressions resulting in a serious breach of any law, including but not limited to, corruption, fraud, theft, extortion and contraventions of the Competition Act 89 of 1998, which occurred in the last 5 (five) years with any other public sector undertaking, government department or private sector company that could justify its exclusion from its registration on the Tenderer's/Service Provider's/Contractor's database or any tendering process.

7.2 If it is found to be that the Tenderer/Service Provider/Contractor made an incorrect statement on this subject, the Tenderer/Service Provider/Contractor can be rejected from the registration process or removed from the Tenderer/ Service Provider/Contractor database, if already registered, for such reason (refer to the Breach of Law Returnable Form contained in the document.)

8 **SANCTIONS FOR VIOLATIONS**

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8.1 Transnet shall also take all or any one of the following actions, wherever required to:

- a) Immediately exclude the Tenderer/Service Provider/Contractor from the tendering process or call off the pre-contract negotiations without giving any compensation the Tenderer/Service Provider/Contractor. However, the proceedings with the other Tenderer/ Service Provider/Contractor may continue;
- b) Immediately cancel the contract, if already awarded or signed, without giving any compensation to the Tenderer/Service Provider/Contractor;
- c) Recover all sums already paid by Transnet;
- d) Encash the advance bank guarantee and performance bond or warranty bond, if furnished by the Tenderer/Service Provider/Contractor, in order to recover the payments, already made by Transnet, along with interest;
- e) Cancel all or any other contracts with the Tenderer/Service Provider/Contractor; and
- f) Exclude the Tenderer/ Service Provider/Contractor from entering into any Tender with Transnet in future.

9 **CONFLICTS OF INTEREST**

9.1 A conflict of interest includes, inter alia, a situation in which:

- a) A Transnet employee has a personal financial interest in a tendering / supplying entity; and
- b) A Transnet employee has private interests or personal considerations or has an affiliation or a relationship which affects, or may affect, or may be perceived to affect his / her judgment in action in the best interest of Transnet, or could affect the employee's motivations for acting in a particular manner, or which could result in, or be perceived as favouritism or nepotism.

9.2 A Transnet employee uses his / her position, or privileges or information obtained while acting in the capacity as an employee for:

- a) Private gain or advancement; or
- b) The expectation of private gain, or advancement, or any other advantage accruing to the employee must be declared in a prescribed form.

Thus, conflicts of interest of any Tender committee member or any person involved in the sourcing process must be declared in a prescribed form.

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9.3 If a Tenderer/Service Provider/Contractor has or becomes aware of a conflict of interest i.e. a family, business and / or social relationship between its owner(s)/ member(s)/director(s)/partner(s)/shareholder(s) and a Transnet employee/ member of Transnet's Board of Directors in respect of a Tender which will be considered for the Tender process, the Tenderer/Service Provider/ Contractor:

- a) must disclose the interest and its general nature, in the Request for Proposal ("RFX") declaration form; or
- b) must notify Transnet immediately in writing once the circumstances has arisen.

9.4 The Tenderer/Service Provider/Contractor shall not lend to or borrow any money from or enter into any monetary dealings or transactions, directly or indirectly, with any committee member or any person involved in the sourcing process, where this is done, Transnet shall be entitled forthwith to rescind the contract and all other contracts with the Tenderer/Service Provider/Contractor.

10 **DISPUTE RESOLUTION**

10.1 Transnet recognises that trust and good faith are pivotal to its relationship with its Tenderer / Service Provider / Contractor. When a dispute arises between Transnet and its Tenderer / Service Provider / Contractor, the parties should use their best endeavours to resolve the dispute in an amicable manner, whenever possible. Litigation in bad faith negates the principles of trust and good faith on which commercial relationships are based. Accordingly, following a blacklisting process as mentioned in paragraph 6 above, Transnet will not do business with a company that litigates against it in bad faith or is involved in any action that reflects bad faith on its part. Litigation in bad faith includes, but is not limited to the following instances:

- a) **Vexatious proceedings:** these are frivolous proceedings which have been instituted without proper grounds;
- b) **Perjury:** where a Tenderer / Service Provider / Contractor make a false statement either in giving evidence or on an affidavit;
- c) **Scurrilous allegations:** where a Tenderer / Service Provider / Contractor makes allegations regarding a senior Transnet employee which are without proper foundation, scandalous, abusive or defamatory; and
- d) **Abuse of court process:** when a Tenderer / Service Provider / Contractor abuses the court process in order to gain a competitive advantage during a Tender process.

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11 **GENERAL**

11.1 This Integrity Pact is governed by and interpreted in accordance with the laws of the Republic of South Africa.

11.2 The actions stipulated in this Integrity Pact are without prejudice to any other legal action that may follow in accordance with the provisions of the law relating to any civil or criminal proceedings.

11.3 The validity of this Integrity Pact shall cover all the tendering processes and will be valid for an indefinite period unless cancelled by either Party.

11.4 Should one or several provisions of this Integrity Pact turn out to be invalid the remainder of this Integrity Pact remains valid.

11.5 Should a Tenderer/Service Provider/Contractor be confronted with dishonest, fraudulent or corruptive behaviour of one or more Transnet employees, Transnet expects its Tenderer/Service Provider/Contractor to report this behaviour directly to a senior Transnet official/employee or alternatively by using Transnet's "Tip-Off Anonymous" hotline number 0800 003 056, whereby your confidentiality is guaranteed.

The Parties hereby declare that each of them has read and understood the clauses of this Integrity Pact and shall abide by it. To the best of the Parties' knowledge and belief, the information provided in this Integrity Pact is true and correct.

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I duly authorised by the tendering entity, hereby certify that the tendering entity are **fully acquainted** with the contents of the Integrity Pact and further **agree to abide by it** in full.

Signature

Date

DESCRIPTION OF THE WORKS: FOR THE PROVISION OF DESIGN, ENGINEERING, SUPPLY, PROCUREMENT, FABRICATION, SOFTWARE DEVELOPMENT, TESTING, INSTALLATION, COMMISSIONING AND HANDOVER OF PROCESS CONTROL, INTEGRATED CUSTODY METERING AND PIPELINE MONITORING SYSTEMS TO ALL TRANSNET PIPELINES INLAND STATIONS, MASTER, AND SECONDARY CONTROL CENTRES – **MAIN AUTOMATION CONTRACT.**

T2.2-20: Supplier Code of Conduct

Transnet SOC Limited aims to achieve the best value for money when buying or selling goods and obtaining services. This however must be done in an open and fair manner that supports and drives a competitive economy. Underpinning our process are several acts and policies that any supplier dealing with Transnet must understand and support. These are:

- The Transnet Procurement Policy – A guide for Tenderers.
- Section 217 of the Constitution - the five pillars of Public PSCM (Procurement and Supply Chain Management): fair, equitable, transparent, competitive and cost effective;
- The Public Finance Management Act (PFMA);
- The Broad Based Black Economic Empowerment Act (BBBEE)
- The Prevention and Combating of Corrupt Activities Act (PRECCA); and
- The Construction Industry Development Board Act (CIDB Act).

This code of conduct has been included in this contract to formally appraise Transnet Suppliers of Transnet's expectations regarding behaviour and conduct of its Suppliers.

Prohibition of Bribes, Kickbacks, Unlawful Payments, and Other Corrupt Practices

Transnet is in the process of transforming itself into a self-sustaining State Owned Enterprise, actively competing in the logistics industry. Our aim is to become a world class, profitable, logistics organisation. As such, our transformation is focused on adopting a performance culture and to adopt behaviours that will enable this transformation.

1. Transnet SOC Limited will not participate in corrupt practices. Therefore, it expects its suppliers to act in a similar manner.

- Transnet and its employees will follow the laws of this country and keep accurate business records that reflect actual transactions with, and payments to, our suppliers.
- Employees must not accept or request money or anything of value, directly or indirectly, from suppliers.
- Employees may not receive anything that is calculated to:
 - Illegally influence their judgement or conduct or to ensure the desired outcome of a sourcing activity;

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- Win or retain business or to influence any act or decision of any person involved in sourcing decisions; or
- Gain an improper advantage.
- There may be times when a supplier is confronted with fraudulent or corrupt behaviour of Transnet employees. We expect our Suppliers to use our “Tip-offs Anonymous” Hot line to report these acts. (0800 003 056).

2. *Transnet SOC Limited is firmly committed to the ideas of free and competitive enterprise.*

- Suppliers are expected to comply with all applicable laws and regulations regarding fair competition and antitrust practices.
- Transnet does not engage with non-value adding agents or representatives solely for the purpose of increasing BBBEE spend (fronting).

3. *Transnet’s relationship with suppliers requires us to clearly define requirements, to exchange information and share mutual benefits.*

- Generally, suppliers have their own business standards and regulations. Although Transnet cannot control the actions of our suppliers, we will not tolerate any illegal activities. These include, but are not limited to:
 - Misrepresentation of their product (origin of manufacture, specifications, intellectual property rights, etc);
 - Collusion;
 - Failure to disclose accurate information required during the sourcing activity (ownership, financial situation, BBBEE status, etc.);
 - Corrupt activities listed above; and
 - Harassment, intimidation or other aggressive actions towards Transnet employees.
- Suppliers must be evaluated and approved before any materials, components, products or services are purchased from them. Rigorous due diligence is conducted and the supplier is expected to participate in an honest and straight forward manner.
- Suppliers must record and report facts accurately, honestly and objectively. Financial records must be accurate in all material respects.

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Conflicts of Interest

A conflict of interest arises when personal interests or activities influence (or appear to influence) the ability to act in the best interests of Transnet SOC Limited.

- Doing business with family members.
- Having a financial interest in another company in our industry

Where possible, contracts will be negotiated to include the above in the terms of such contracts. To the extent such terms are not included in contractual obligations and any of the above code is breached, then Transnet reserves its right to review doing business with these suppliers.

I, _____ of _____
(insert name of Director or as per Authority) *(insert name of Company)*
Resolution from Board of Directors)

hereby acknowledge having read, understood and agree to the terms and conditions set out in the "Transnet Supplier Code of Conduct."

Signed this on day _____ at _____

Signature

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T2.2-21: Insurance provided by the *Contractor*

Clause 84.1 in NEC3 Engineering & Construction Contract (June 2005)(amended June 2006 and April 2013) requires that the *Contractor* provides the insurance stated in the insurance table except any insurance which the *Employer* is to provide as stated in the Contract Data.

Please provide the following details for insurance which the *Contractor* is still to provide. Notwithstanding this information all costs related to insurance are deemed included in the tenderer's rates and prices.

Insurance against (See clause 84.2 of the ECC)	Name of Insurance Company	Cover	Premium
Liability for death of or bodily injury to employees of the <i>Contractor</i> arising out of and in the course of their employment in connection with this contract			
Motor Vehicle Liability Insurance comprising (as a minimum) "Balance of Third Party" Risks including Passenger and Unauthorised Passenger Liability indemnity with a minimum indemnity limit of R5 000 000.			
Insurance in respect of loss of or damage to own property and equipment.			
Professional Indemnity Insurance to cover design of all parts of the <i>Works</i>			

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T2.2-22: Form of Intent to Provide a Performance Guarantee

It is hereby agreed by the Tenderer that a Performance Guarantee drafted **exactly** as provided in the tender documents will be provided by the Guarantor named below, which is a **bank or insurer registered in South Africa**:

Name of Guarantor
(Bank/Insurer)

Address

The Performance Guarantee shall be provided within **2 (Two)** weeks after the Contract Date defined in the contract unless otherwise agreed to by the parties.

Signed

Name

Capacity

On behalf of (name of
tenderer)

Date

Confirmed by Guarantor's Authorised Representative

Signature(s)

Name (print)

Capacity

On behalf of Guarantor
(Bank/insurer)

Date

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T2.2-23: Foreign Exchange Requirements

If Secondary Option X3 is included in the *conditions of contract* of the NEC3, the Tenderer to provide detailed breakdown of items that will have a foreign exchange implication.

Justification and full details supporting foreign currency requirements to be appended to this Schedule.

Items & activities	Currency	Bank	Maximum payment

The *exchange rates* to be used are stated in the Contract Data provided by the *Employer*.

It is expected that the percentages of foreign currency or currencies quoted are realistic and that they adequately reflect the overall foreign component of cost.

Due to the introduction of International Financial Reporting Standards IS32 and IS39, the *Employer* may not be able to accommodate a tenderer's requirements in full or at all.

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T2.2-24: Three (3) years audited financial statements

Attached to this schedule is the last three (3) years audited financial statements of the single tenderer/members of the Joint Venture.

NAME OF COMPANY/IES and INDEX OF ATTACHMENTS:

.....

.....

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.....

.....

.....

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T2.2-25: Transnet Supplier Declaration Form

The completed Supplier Declaration Form together with the required supporting documents as per Appendix V to the Transnet Official who is intending to procure your company's services / products, to enable us to process this request. Please only submit the documentation relevant to your request.

NB: Effective 1 April 2016 all organisations, institutions and individuals who wish to provide goods and/or services to Organs of the State must be registered on the National Treasury Central Supplier Database (CSD). This needs to be done via their portal at <https://secure.csd.gov.za/> **before applying to Transnet.**

General Terms and Conditions:

Failure to submit the relevant documentation will delay the vendor creation / change process.

Where applicable, the respective Transnet Operating Division processing your application may request further information from you.

The Service Provider warrants that the details of its bank account ("the nominated account") provided herein, are correct and acknowledges that payments due to the Supplier will be made into the nominated account. If details of the nominated account should change, the Service Provider must notify Transnet in writing of such change, failing which any payments made by Transnet into the nominated account will constitute a full discharge of the indebtedness of Transnet to the Supplier in respect of the payment so made. Transnet will incur no liability for any payments made to the incorrect account or any costs associated therewith. In such event, the Service Provider indemnifies and holds Transnet harmless in respect of any payments made to an incorrect bank account and will, on demand, pay Transnet any costs associated herewith.

Transnet expects its suppliers to timeously renew their Tax Clearance and B-BBEE certificates (where applicable, as EMEs and QSEs are only expected to supply an affidavit as per Appendix III and IV), as well as all affidavits, annually. Failure to do so may result in the supplier's account being temporarily suspended.

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SUPPLIER DECLARATION FORM

NB: Effective 1 April 2016 all organisations, institutions and individuals who wish to provide goods and/or services to Organs of the State must be registered on the National Treasury Central Supplier Database (CSD). This needs to be done via their portal at <https://secure.csd.gov.za/> **before applying to Transnet.**

CSD Number (MAAA xxxxxxxx):

Company Trading Name						
Company Registered Name						
Company Registration No. Or ID No If a Sole Proprietor						
Company Income Tax Number						
Form of Entity	CC	Trust	Pty Ltd	Limited	Partnership	Sole Proprietor
	Non-profit	Personal Liability Co	State Owned Co	National Govt	Provincial Govt	Local Govt
	Education al Institution	Specialise d Profession	Financial Institution	Foreign Internationa l	Foreign Branch Office	

Did your company previously operate under another name?					Yes		No	
If YES state the previous details below:								
Trading Name								
Registered Name								
Company Registration No Or ID No If a Sole Proprietor								
Form of Entity	CC	Trust	Pty Ltd	Limited	Partnership	Sole Proprietor		
	Non-profit	Personal Liability Co	State Owned Co	National Govt	Provincial Govt	Local Govt		
	Education al Institution	Specialise d Profession	Financial Institution	Foreign Internationa l	Foreign Branch Office			

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Your Current Company's VAT Registration Status	
VAT Registration Number	
If Exempted from VAT registration , state reason and submit proof from SARS in confirming the exemption status	
If your business entity is not VAT Registered, please submit a current original sworn affidavit (see example in Appendix I). Your Non VAT Registration must be confirmed annually.	

Company Banking Details		Bank Name	
Universal Branch Code		Bank Account Number	

Company Physical Address		
		Code
Company Postal Address		
		Code
Company Telephone number		
Company Fax Number		
Company E-Mail Address		
Company Website Address		

Company Contact Person Name	
Designation	
Telephone	
Email	

Is your company a Labour Broker?	Yes		No	
Main Product / Service Supplied e.g. Stationery / Consulting / Labour etc.				
How many personnel does the business employ?	Full Time		Part Time	
Please Note: Should your business employ more than 2 full time employees who are not connected persons as defined in the Income Tax Act, please submit a sworn affidavit, as per Appendix II.				

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Most recent Financial Year's Annual Turnover	<R10Million		>R10Million <R50Million		>R50Million	
--	-------------	--	----------------------------	--	-------------	--

Does your company have a valid BBBEE certificate?				Yes		No	
What is your broad based BEE status (Level 1 to 9)							
Majority Race of Ownership							
% Black Ownership		% Black Women ownership		% Black Disabled person(s) ownership		% Black Youth ownership	
Please Note: Please provide proof of BBBEE status as per Appendix V. If you qualify as an EME or QSE then provide an affidavit following the examples provided in Appendix III and IV respectively. If you have indicated Black Disabled person(s) ownership, then provide a certified letter signed by a physician, on the physician's letterhead, confirming the disability.							

By signing below, I hereby verify that I am duly authorised to sign for and on behalf of firm / organisation and that all information contained herein and attached herewith are true and correct

Name		Designation	
Signature		Date	

Stamp And Signature Of Commissioner Of Oaths

Name		Date	
Signature		Telephone No	



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Internal Transnet Departmental Questionnaire (For Office Use Only)

Company Trading Name	
Company Registered Name	

Operating Division

TFR		TFR RME		TE		TPT		TPL		TNPA		TRN PROP		TRN TCC		TRN FOU N		TRN TCP	
Create				Amend				Block						Unblock					
Extend				Delete				Undelete						Once-Off / Emergency					

Please indicate whether the Supplier has a contract with sourcing Transnet OD	Yes		No	
If yes, please submit a copy of the adjudication document / signed-off comparative schedule				

Transnet B-BBEE Department Contact Person		Signature	
Contact number		Email	

THE FOLLOWING IS TO BE COMPLETED BY THE TRANSNET REQUESTING/SOURCING DEPARTMENT. THE FULL SET OF VENDOR RELATED DOCUMENTS MUST THEN BE FORWARDED TO THE APPROPRIATE VENDOR APPROVAL OFFICIAL FOR APPROVAL

What is being procured from the supplier?

Products Only	Yes		No	
Services Only	Yes		No	
Labour Only	Yes		No	
Mix of Products and Services	Yes		No	

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Mix of Services and Labour	Yes		No	
----------------------------	-----	--	----	--

If your answer is YES to any of the questions ii to v above and the applicant supplier has not submitted a sworn affidavit as per Appendix II, the matter should be further investigated in terms of the Tax Withholding Procedures. Where necessary you may approach your Operating Division's Procurement Department for guidance in this regard. Details of the appropriate Transnet decision-making body such as a Cross Functional Sourcing Team, should be indicated below. **A copy of the signed-off document by the mentioned decision-making body should also be attached.**

Type	Deduct Tax		If Tax should be deducted (Indicate % to be deducted)	Department Responsible for Payment (PROCUREMENT OR *PAYROLL) * IF PAYROLL SHOULD EFFECT PAYMENT, THE DOCUMENTS SHOULD BE FORWARDED TO THEIR OFFICE
Service Provider	Yes	No		
Labour broker without IRP30 exemption certificate	Yes	No		
Labour broker with IRP30 exemption certificate	Yes	No		
Personal Service Provider	Yes	No		
Independent Contractor	Yes	No		
None of the above apply, state reason				
If PAYE is to be deducted, please indicate whether the applicant supplier has indicated in writing that it is prepared to comply with Transnet's PAYE conditions. (Please attached a copy of the written communication) If the reply is "NO", the vendor application will be regarded as cancelled and another service provider should be sourced.				

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CERTIFICATION AND APPROVAL OF PROPOSED VENDOR CREATION/VENDOR DETAILS UPDATE BY TRANSNET OFFICIAL WITH APPROPRIATE DELEGATED AUTHORITY.

I hereby certify that the Transnet Procurement Procedure Manual (PPM) / Procurement Mechanisms have in ALL RESPECTS been adhered to and therefore approve the proposed vendor creation/vendor details update.

Vendor Approval Official's Details													
Name					Designation								
Tel No					Fax No								
e-Mail													
Signature					Date	Y	Y	Y	Y	M	M	D	D

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Appendix I

Example of an Affidavit or Solemn Declaration as to VAT registration status

Affidavit or Solemn Declaration

I, _____ solemnly swear/declare
that _____ is not a registered VAT
vendor and is not required to register as a VAT vendor because the combined value of taxable
supplies made by the provider in any 12 month period has not exceeded or is not expected to
exceed R1 million threshold, as required in terms of the Value Added Tax Act.

Signature: _____

Designation: _____

Date: _____

Commissioner of Oaths

Thus signed and sworn to before me at _____ on this the _____ day
of _____ 20_____,

the Deponent having knowledge that he/she knows and understands the contents of this Affidavit,
and that he/she has no objection to taking the prescribed oath, which he/she regards binding on
his/her conscience and that the allegations herein contained are all true and correct.

Commissioner of Oaths

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Appendix II

Example of an Affidavit or Solemn Declaration as to number of employees

Affidavit or Solemn Declaration

I, _____ solemnly swear/declare
that _____ employs three or more full time employees,
which employees are engaged in the business of rendering the services of the organization and are
not connected persons as defined in the Income Tax Act.

Signature: _____

Designation: _____

Date: _____

Commissioner of Oaths

Thus signed and sworn to before me at _____ on this the _____ day
of _____ 20____,

the Deponent having knowledge that he/she knows and understands the contents of this Affidavit,
and that he/she has no objection to taking the prescribed oath, which he/she regards binding on
his/her conscience and that the allegations herein contained are all true and correct.

Commissioner of Oaths

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Appendix III

SWORN AFFIDAVIT – B-BBEE EXEMPTED MICRO ENTERPRISE

I, the undersigned,

Full name & Surname	
Identity number	

Hereby declare under oath as follows:

1. The contents of this statement are to the best of my knowledge a true reflection of the facts.
2. I am a member / director / owner of the following enterprise and am duly authorised to act on its behalf:

Enterprise Name	
Trading Name	
Registration Number	
Enterprise Address	

3. I hereby declare under oath that:

- • The enterprise is _____% black owned;
- • The enterprise is _____% black woman owned;
- • The enterprise is _____% black youth owned;
- • The enterprise is _____% black disable owned;

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- Based on the management accounts and other information available on the _____ financial year, the income did not exceed R10, 000,000.00 (ten million rands);

Please confirm on the table below the B-BBEE level contributor, **by ticking the applicable box.**

100% black owned	Level One (135% B-BBEE procurement recognition) More than 51% black	
More than 51% black owned	Level Two (125% B-BBEE procurement recognition) Less than 51% black	
Less than 51% black owned	Level Four (100% B-BBEE procurement recognition)	

- The entity is an empowering supplier in terms of **the dti** Codes of Good Practice.
- I know and understand the contents of this affidavit and I have no objection to take the prescribed oath and consider the oath binding on my conscience and on the owners of the enterprise which I represent in this matter.
- The sworn affidavit will be valid for a period of 12 months from the date signed by commissioner.

Deponent Signature:

Date: _____

Commissioner of Oaths

Signature & stamp

TENDER NUMBER: **TPL/2024/06/0005/68787/RFP**

DESCRIPTION OF THE WORKS: FOR THE PROVISION OF DESIGN, ENGINEERING, SUPPLY, PROCUREMENT, FABRICATION, SOFTWARE DEVELOPMENT, TESTING, INSTALLATION, COMMISSIONING AND HANDOVER OF PROCESS CONTROL, INTEGRATED CUSTODY METERING AND PIPELINE MONITORING SYSTEMS TO ALL TRANSNET PIPELINES INLAND STATIONS, MASTER, AND SECONDARY CONTROL CENTRES – **MAIN AUTOMATION CONTRACT.**

Appendix IV

SWORN AFFIDAVIT - B-BBEE QUALIFYING SMALL ENTERPRISE

I the undersigned,

Full Name & Surname:	
Identity Number:	

Herby declares under oath as follows:

1. The contents of this statement are to the best of my knowledge a true reflection of the facts.
2. I am a member / director / owner of the following enterprise and am duly authorised to act on its behalf.

Enterprise Name:	
Trading Name:	
Registration Number:	
Enterprise Address:	

3. I hereby declare under oath that:

- The enterprise is _____% black owned;
- The enterprise is _____% black woman owned;
- The enterprise is _____% black youth owned;
- The enterprise is _____% black disabled owned;
- Based on the management accounts and other information available for the _____ financial year, the income did not exceed R50,000,000.00 (fifty million rand).
- The entity is an empowering supplier in terms of Clause 3.3 (a) or (b) or (c) or (d) or as amended 3.3 (e) of **the dti** Codes of Good Practise. **(Tick appropriate box in table below).**

(a) At least 25% of cost of sales (excluding labour costs and depreciation) must be procurement from local producers or		(b) Job creation – 50% of Jobs created are for black people, provided that the number of black	
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suppliers in South Africa; for the services industry include labour costs but capped at 15%.		employees in the immediate prior verified B-BBEE measurement is maintained.	
(c) At least 25% transformation of raw material / beneficiation which include local manufacturing, production and /or assembly, and /or packaging		(d) At least 12 days per annum of productivity deployed in assisting QSE and EME beneficiaries to increase their operation or financial capacity.	
(e) At least 85% of labour costs should be paid to South African employees by service industry entities.			

Please confirm on the Table below the B-BBEE Level Contribution, **by ticking (✓) the applicable box:**

100% Black Owned	Level One (135% B-BBEE Procurement Recognition)	
More than 51% Black Owned	Level Two (125% B-BBEE Procurement Recognition)	

(f) I know and understand the contents of this affidavit and I have no objection to take the prescribed oath and consider the oath binding on my conscience and on the owners of the enterprise which I represent in this matter.

(g) The sworn affidavit will be valid for a period of 12 months from the date signed by the Commissioner.

Deponent Signature:

.....

Date:

.....

.....

Commissioner of Oaths

Signature & Stamp

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T2.2-26: Protection of Personal Information Act, 4 of 2013 ("POPIA")

1. The following terms shall bear the same meaning as contemplated in Section 1 of the Protection of Person information act, No. of 2013 "(POPIA)":

consent; data subject; electronic communication; information officer; operator; person; personal information; processing; record; Regulator; responsible party; special information; as well as any terms derived from these terms.
2. Transnet will process all information by the Transnet in terms of the requirements contemplated in Section 4(1) of the POPIA:

Accountability; Processing limitation; Purpose specification; Further processing limitation; Information quality; Openness; Security safeguards and Data subject participation.
3. The Parties acknowledge and agree that, in relation to personal information that will be processed pursuant to this RFP, the Responsible party is "Transnet" and the Data subject is "Respondent". Transnet will process personal information only with the knowledge and authorisation of the Respondent and will treat personal information and the information of a third party which comes to its knowledge as confidential and will not disclose it, unless so required by law or subject to the exceptions contained in the POPIA.
4. Transnet reserves all the rights afforded to it by the POPIA in the processing of any of its information as contained in this Agreement and the Operator is required to comply with all prescripts as detailed in the POPIA relating to all information concerning Transnet.
5. In responding to this bid, Transnet acknowledges that it will obtain and have access to personal information of Transnet and the information of a third party and agrees that it shall only process the information disclosed by Transnet in terms of this Agreement and only for the purposes as detailed in this Agreement and in accordance with any applicable law.
6. Transnet further agrees that in submitting any information or documentation requested in this RFP, the Respondent is consenting to the further processing of their personal information for the purpose of, but not limited to, risk assessment, assurances, contract award, contract management, auditing, legal opinions/litigations, investigations (if applicable), document storage for the legislatively required period,

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destruction, de-identification and publishing of personal information by Transnet and/or its authorised appointed third parties.

7. Furthermore, Transnet will not otherwise modify, amend or alter any personal data submitted by the Respondent or disclose or permit the disclosure of any personal data to any third party without the prior written consent from the Respondent. Similarly, Transnet requires the Respondent to process any personal information disclosed by Transnet in the bidding process in the same manner.
8. Transnet shall, at all times, ensure compliance with any applicable laws put in place and maintain sufficient measures, policies and systems to manage and secure against all forms of risks to any information that may be shared or accessed pursuant to this RFI (physically, through a computer or any other form of electronic communication).
9. Transnet shall notify Respondent in writing of any unauthorised access to information, cybercrimes or suspected cybercrimes, in its knowledge and report such crimes or suspected crimes to the relevant authorities in accordance with applicable laws, after becoming aware of such crimes or suspected crime. The Respondent must take all necessary remedial steps to mitigate the extent of the loss or compromise of personal information and to restore the integrity of the affected personal information as quickly as is possible.
10. The respondent may, in writing, request Transnet to confirm and/or make available any personal information and in its possession in relation to the Respondent and if such personal information has been accessed by third parties and the identity thereof in terms of the POPIA. The Respondent may further request that Transnet correct (excluding critical/mandatory or evaluation information), delete, destroy, withdraw consent or object to the processing of any personal information relating to the Respondent in Transnet's possession in terms of the provision of the POPIA and utilizing Form 2 of the POPIA Regulations .
11. In submitting any information or documentation requested in this RFI, the Respondent is hereby consenting to the processing of their personal information for the purpose of this RFI and further confirming that they are aware of their rights in terms of Section 5 of POPIA

Respondents are required to provide consent below:

YES		NO	
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12. The Respondent declares that the personal information submitted for the purpose of this RFI is complete, accurate, not misleading, is up to date and may be updated where applicable.

Signature of Respondent's authorised representative: _____

13. Should a Respondent have any complaints or objections to processing of its personal information, by Transnet, the Tenderer can submit a complaint to the Information Regulator on <https://www.justice.gov.za/infoereg/>, click on contact us, click on complaints.IR@justice.gov.za

PART C THE CONTRACT

Part C1: Agreements and Contract Data

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C1.1: Form of Offer & Acceptance

Offer

The Employer, identified in the Acceptance signature block, has solicited offers to enter into a contract for the procurement of:

FOR THE PROVISION OF DESIGN, ENGINEERING, SUPPLY, PROCUREMENT, FABRICATION, SOFTWARE DEVELOPMENT, TESTING, INSTALLATION, COMMISSIONING AND HANDOVER OF PROCESS CONTROL, INTEGRATED CUSTODY METERING AND PIPELINE MONITORING SYSTEMS TO ALL INLAND STATIONS, MASTER AND SECONDARY CONTROL CENTRES – **MAIN AUTOMATION CONTRACT**.

The tenderer, identified in the Offer signature block, has examined the documents listed in the Tender Data and addenda thereto as listed in the Returnable Schedules, and by submitting this Offer has accepted the Conditions of Tender.

By the representative of the tenderer, deemed to be duly authorised, signing this part of this Form of Offer and Acceptance the tenderer offers to perform all of the obligations and liabilities of the *Contractor* under the contract including compliance with all its terms and conditions according to their true intent and meaning for an amount to be determined in accordance with the *conditions of contract* identified in the Contract Data.

The offered total of the Prices exclusive of VAT is	R
Value Added Tax @ 15% is	R
The offered total of the Prices inclusive of VAT is	R
(in words)	

This Offer may be accepted by the Employer by signing the Acceptance part of this Form of Offer and Acceptance and returning one copy of this document including the Schedule of Deviations (if any) to the tenderer before the end of the period of validity stated in the Tender Data, or other period as agreed, whereupon the tenderer becomes the party named as the *Contractor* in the *conditions of contract* identified in the Contract Data.

Signature(s)

Name(s)

Capacity

**For the
tenderer:**

(Insert name and address of organisation)

Name &
signature of
witness

Date

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Acceptance

By signing this part of this Form of Offer and Acceptance, the *Employer* identified below accepts the tenderer's Offer. In consideration thereof, the *Employer* shall pay the *Contractor* the amount due in accordance with the *conditions of contract* identified in the Contract Data. Acceptance of the tenderer's Offer shall form an agreement between the *Employer* and the tenderer upon the terms and conditions contained in this agreement and in the contract that is the subject of this agreement.

The terms of the contract, are contained in:

Part C1	Agreements and Contract Data, (which includes this Form of Offer and Acceptance)
Part C2	Pricing Data
Part C3	Scope of Work: Works Information
Part C4	Site Information

and drawings and documents (or parts thereof), which may be incorporated by reference into the above listed Parts.

Deviations from and amendments to the documents listed in the Tender Data and any addenda thereto listed in the Returnable Schedules as well as any changes to the terms of the Offer agreed by the tenderer and the Employer during this process of offer and acceptance, are contained in the Schedule of Deviations attached to and forming part of this Form of Offer and Acceptance. No amendments to or deviations from said documents are valid unless contained in this Schedule.

The tenderer shall within two weeks of receiving a completed copy of this agreement, including the Schedule of Deviations (if any), contact the Employer's agent (whose details are given in the Contract Data) to arrange the delivery of any securities, bonds, guarantees, proof of insurance and any other documentation to be provided in terms of the *conditions of contract* identified in the Contract Data at, or just after, the date this agreement comes into effect. Failure to fulfil any of these obligations in accordance with those terms shall constitute a repudiation of this agreement.

Notwithstanding anything contained herein, this agreement comes into effect on the date when the tenderer receives one fully completed original copy of this document, including the Schedule of Deviations (if any).

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Unless the tenderer (now *Contractor*) within five working days of the date of such receipt notifies the Employer in writing of any reason why he cannot accept the contents of this agreement, this agreement shall constitute a binding contract between the Parties.

Signature(s)

Name(s)

Capacity

**for the
Employer**

Transnet SOC limited trading as Transnet Pipelines
202 Anton Lembede Street
Durban, South Africa
4001

(Insert name and address of organisation)

Name &
signature of
witness

Date

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Schedule of Deviations

Note:

1. To be completed by the Employer prior to award of contract. This part of the Offer & Acceptance would not be required if the contract has been developed by negotiation between the Parties and is not the result of a process of competitive tendering.
2. The extent of deviations from the tender documents issued by the Employer prior to the tender closing date is limited to those permitted in terms of the Conditions of Tender.
3. A tenderer's covering letter must not be included in the final contract document. Should any matter in such letter, which constitutes a deviation as aforesaid be the subject of agreement reached during the process of Offer and Acceptance, the outcome of such agreement shall be recorded here and the final draft of the contract documents shall be revised to incorporate the effect of it.

No.	Subject	Details
1		
2		
3		
4		

By the duly authorised representatives signing this Schedule of Deviations below, the Employer and the tenderer agree to and accept this Schedule of Deviations as the only deviations from and amendments to the documents listed in the Tender Data and any addenda thereto listed in the Tender Schedules, as well as any confirmation, clarification or changes to the terms of the Offer agreed by the tenderer and the Employer during this process of Offer and Acceptance.

It is expressly agreed that no other matter whether in writing, oral communication or implied during the period between the issue of the tender documents and the receipt by the tenderer of a completed signed copy of this Form shall have any meaning or effect in the contract between the parties arising from this Agreement.

For the tenderer:

For the Employer

Signature

Name

Capacity

On behalf
of

(Insert name and address of organisation)

Transnet SOC Ltd

Name &
signature
of witness

Date



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C1.2 Contract Data

Part one - Data provided by the *Employer*

Clause	Statement	Data
1	General	
	The <i>conditions of contract</i> are the core clauses and the clauses for main Option	
		A: Priced contract with activity schedule
	dispute resolution Option	W1: Dispute resolution procedure
	and secondary Options	
		X2 Changes in the law
		X5: Sectional Completion
		X7: Delay damages
		X13: Performance Bond
		X13: Retention
		X18: Limitation of liability
		Z: Additional conditions of contract
		Z1: Obligations in respect of Job Creation
		Z2 Additional clause relating to Performance Bonds and/or Guarantees
		Z3: Additional clauses relating to Joint Ventures
		Z4: Additional obligations in respect of Termination
		Z5: Right Reserved by Employer to conduct Vetting through SSA
		Z6: Additional Clause Relating to Collusion in the Construction Industry



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-
- Z7: Additional Clause Relating to the Employer's rights to take appropriate action**
 - Z8: Protection of Personal Information Act**
 - Z9: Time**
 - Z10: Compensation Events**
 - Z11: Limitation of liability**
 - Z12: Additional clauses relating to cession of rights**
 - Z13: Additional clauses relating to interpretation of the law**
 - Z14: Employer's Step-in rights**
 - Z15: Intellectual Property (IP)**
 - Z16: Phase 1: Development (Design Review by the Employer)**
 - Z17: Phase 2B, 2C: Execution (Design Review by the Employer)**
 - Z18: Access to the OEM Centres of Excellence**
 - Z19: Provisional Cost Sums**
 - Z20: Restraint of Trade**
 - Z21: Contract Hedging**
 - Z22: Partnership**

of the NEC3 Engineering and Construction Contract June 2005 (amended June 2006 and April 2013)

10.1

The *Employer* is:

Transnet SOC Ltd
(Registration No. 1990/000900/30)



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	Address	Registered address: Transnet Corporate Centre 138 Eloff Street Braamfontein Johannesburg 2000
	Having elected its Contractual Address for the purposes of this contract as:	Transnet Pipelines 202 Anton Lambede Street Durban 4001
10.1	The <i>Project Manager</i> is: (Name)	TBA
	Address	Transnet Pipelines 202 Anton Lembede Street Durban 4001
	Tel	TBA
	e-mail	TBA
10.1	The <i>Supervisor</i> is: (Name)	TBA
	Address	
	Tel No.	
	e-mail	
11.2(13)	The <i>works</i> are	Inland Network Automation Project , which includes the provision of design, engineering, supply, procurement, fabrication, software development, testing, installation, commissioning and handover of Process Control, Integrated Custody Metering and Pipeline Monitoring Systems to all Inland Stations, Master and Secondary Control Centres – Main Automation Contract



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11.2(14)	The following matters will be included in the Risk Register	All those matters recorded in accordance with clause 16.1 of the Contract. - Working on Depots where other Contractors are working - Working on Depots that are operational	
11.2(15)	The <i>boundaries of the site</i> are	Refer to Part C3	
11.2(16)	The Site Information is in	Part C3	
11.2(19)	The Works Information is in	Part C3	
12.2	The <i>law of the contract</i> is the law of	the Republic of South Africa subject to the jurisdiction of the Courts of South Africa.	
13.1	The <i>language of this contract</i> is	English	
13.3	The <i>period for reply</i> is	2 (two) weeks	
2	The <i>Contractor's</i> main responsibilities	No additional data is required for this section of the <i>conditions of contract</i>.	
3	Time		
11.2(3)	The <i>completion date</i> for the whole of the <i>works</i> is	25 February 2030 (Anticipated)	
11.2(9)	The <i>key dates</i> and the <i>conditions</i> to be met are:	Condition to be met	key date
		1 Development Phase 1 Completion	17 October 2025
		2 Phase 2A Handover Completion	15 September 2026
		3 Phase 2B Handover Completion	08 December 2027
		4 Phase 2C Handover Completion	12 February 2029
		5 Phase 2D Handover Completion	18 September 2029
		6 Phase 2E Handover Completion	11 December 2029



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		7	Phase 2A PLMS Handover	30 November 2026
		8	Phase 2B PLMS Handover	06 April 2028
		9	Phase 2C PLMS Handover	20 June 2029
		10	Phase 2D PLMS Handover	07 January 2030
		11	Project Closeout	25 February 2030
30.1	The <i>access dates</i> are		Part of the Site	Date
		1	Phase 1 Development	12 December 2024 (Anticipated)
		2	Phase 2A	12 December 2024 (Anticipated)
		3	Phase 2B, 2C, 2D, 2E	On completion of Phase 1 Works
31.1	The <i>Contractor</i> is to submit a first programme for acceptance within	2 weeks of the Contract Date.		
31.2	The <i>starting date</i> is	12 December 2024		
32.2	The <i>Contractor</i> submits revised programmes at intervals no longer than	4 (four) weeks.		
4	Testing and Defects			
42.2	The <i>defects date</i> is	52 (fifty two) weeks after Completion of the whole of the <i>works</i>.		
43.2	The <i>defect correction period</i> is	2 weeks		
	except that the <i>defect correction period</i> for	Category 1 Defects – Defects which impact safety or production: is immediately after notification		
	except that the <i>defect correction period</i> for	Category 2 Defects – Defects which impair control system performance: is within 48 hours of notification		



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	except that the <i>defect correction period</i> for	Category 3 Defects – Defects which do not fall within the above two categories: is within 14 days of notification
5	Payment	
50.1	The <i>assessment interval</i> is	18th (eighteenth) day of each successive month.
51.1	The <i>currency of this contract</i> is the	South African Rand.
51.2	The period within which payments are made is	Payment will be effected on or before the last day of the month following the month during which a valid Tax Invoice and Statement were received.
51.4	The <i>interest rate</i> is	the prime lending rate of Rand Merchant Bank of South Africa.
6	Compensation events	
60.1(13)	The <i>weather measurements</i> to be recorded for each calendar month are,	the cumulative rainfall (mm) the number of days with rainfall more than 10 mm the number of days with minimum air temperature less than 0 degrees Celsius the number of days with snow lying at 08:00 hours South African Time
	The place where weather is to be recorded (on the Site) is:	Site as defined in 11.2 (15) above
	The <i>weather data</i> are the records of past <i>weather measurements</i> for each calendar month which were recorded at:	South African Weather Service 012 367 6023 or info3@weathersa.co.za.



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and which are available from: **South African Weather Service 012 367 6023 or info3@weathersa.co.za.**

7	Title	No additional data is required for this section of the <i>conditions of contract</i>.
8	Risks and insurance	
80.1	These are additional <i>Employer's</i> risks	None
84.1	The <i>Employer</i> provides these insurances from the Insurance Table:	
	1 Insurance against:	Loss of or damage to the <i>works</i>, Plant and Materials is as stated in the Insurance policy for Contract Works/ Public Liability.
	Cover / indemnity:	to the extent as stated in the insurance policy for Contract Works / Public Liability
	The deductibles are:	as stated in the insurance policy for Contract Works / Public Liability
	2 Insurance against:	Loss of or damage to property (except the <i>works</i>, Plant and Materials & Equipment) and liability for bodily injury to or death of a person (not an employee of the <i>Contractor</i>) arising out of or in connection with the performance of the Contract as stated in the insurance policy for Contract Works / Public Liability
	Cover / indemnity	Is to the extent as stated in the insurance policy for Contract Works / Public Liability
	The deductibles are	as stated in the insurance policy for Contract Works / Public Liability
	3 Insurance against:	Loss of or damage to Equipment (Temporary Works only) as stated in the insurance policy for contract Works and Public Liability



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	Cover / indemnity	Is to the extent as stated in the insurance policy for Contract Works / Public Liability
	The deductibles are:	As stated in the insurance policy for Contract Works / Public Liability
4	Insurance against:	Contract Works SASRIA insurance subject to the terms, exceptions and conditions of the SASRIA coupon
	Cover / indemnity	Cover / indemnity is to the extent provided by the SASRIA coupon
	The deductibles are	The deductibles are, in respect of each and every theft claim, 0,1% of the contract value subject to a minimum of R2,500 and a maximum of R25,000.
84.1	The minimum limit of indemnity for insurance in respect of death of or bodily injury to employees of the <i>Contractor</i> arising out of and in the course of their employment in connection with this contract for any one event is	The <i>Contractor</i> must comply at a minimum with the provisions of the Compensation for Occupational Injuries and Diseases Act No. 130 of 1993 as amended.
	The <i>Contractor</i> provides these additional Insurances	1 Where the contract requires that the design of any part of the <i>works</i> shall be provided by the <i>Contractor</i> the <i>Contractor</i> shall satisfy the <i>Employer</i> that professional indemnity insurance cover in connection therewith has been affected



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- 2 Where the contract involves manufacture, and/or fabrication of Plant & Materials, components or other goods to be incorporated into the *works* at premises other than the site, the *Contractor* shall satisfy the *Employer* that such plant & materials, components or other goods for incorporation in the *works* are adequately insured during manufacture and/or fabrication and transportation to the site.
 - 3 Should the *Employer* have an insurable interest in such items during manufacture, and/or fabrication, such interest shall be noted by endorsement to the *Contractor's* policies of insurance as well as those of any sub-contractor
 - 4 Motor Vehicle Liability Insurance comprising (as a minimum) "Balance of Third Party" Risks including Passenger and Unauthorised Passenger Liability indemnity with a minimum indemnity limit of R 5 000 000.
 - 7 The insurance coverage referred to in 1, 2, 3, and 4 above shall be obtained from an insurer(s) in terms of an insurance policy approved by the *Employer*. The *Contractor* shall arrange with the insurer to submit to the *Project Manager* the original and the duplicate original of the policy or policies of insurance and the receipts for payment of current premiums, together with a certificate from the insurer or insurance broker concerned, confirming that the policy or policies provide the full coverage as required. The original policy will be returned to the *Contractor*.
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84.2	The minimum limit of indemnity for insurance in respect of loss of or damage to property (except the works, Plant, Materials and Equipment) and liability for bodily injury to or death of a person (not an employee of the <i>Contractor</i>) caused by activity in connection with this contract for any one event is	Whatever the <i>Contractor</i> requires in addition to the amount of insurance taken out by the <i>Employer</i> for the same risk.
84.2	The insurance against loss of or damage to the works, Plant and Materials as stated in the insurance policy for contract works and public liability selected from:	Project Specific Insurance for the contract
9	Termination	Refer to Z Clause Z4
10	Data for main Option clause	
A	Priced contract with Activity Schedule	No additional data is required for this Option.
11	Data for Option W1	
W1.1	The <i>Adjudicator</i> is	Both parties will agree as and when a dispute arises. If the parties cannot reach an agreement on the <i>Adjudicator</i>, the Chairman of the Association of Arbitrators will appoint an <i>Adjudicator</i>.
W1.2(3)	The <i>Adjudicator nominating body</i> is: If no <i>Adjudicator nominating body</i> is entered, it is:	The Chairman of the Association of Arbitrators (Southern Africa) the Association of Arbitrators (Southern Africa)
W1.4(2)	The <i>tribunal</i> is:	Arbitration



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W1.4(5)	The <i>arbitration procedure</i> is	The Rules for the Conduct of Arbitrations of the Association of Arbitrators (Southern Africa)		
	The place where arbitration is to be held is	Durban, South Africa		
	The person or organisation who will choose an arbitrator - if the Parties cannot agree a choice or - if the arbitration procedure does not state who selects an arbitrator, is	The Chairman of the Association of Arbitrators (Southern Africa)		
12	Data for secondary Option clauses			
X2	Changes in the law	No additional data is required for this Option		
X5	Sectional Completion			
X5.1	The <i>completion date</i> for each <i>section</i> of the <i>works</i> is:	<i>Section</i>	<i>Description</i>	<i>Completion date</i>
		1	Development Phase 1 Completion	17 October 2025
		2	Phase 2A Handover Completion	15 September 2026
		3	Phase 2B Handover Completion	08 December 2027
		4	Phase 2C Handover Completion	12 February 2029
		5	Phase 2D Handover Completion	18 September 2029
		6	Phase 2E Handover Completion	11 December 2029
		7	Phase 2A PLMS Handover	30 November 2026
		8	Phase 2B PLMS Handover	06 April 2028



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	9	Phase 2C PLMS Handover	20 June 2029
	10	Phase 2D PLMS Handover	07 January 2030

X5 & X7 Sectional Completion and delay damages used together

X7.1 Delay damages for late

X5.1 Completion of the *sections* of the *works* are:

<i>Section</i>	Description	Amount per day
1	Development Phase 1 Completion	R 25,000.00
2	Phase 2A Handover Completion	R 25,000.00
3	Phase 2B Handover Completion	R 25,000.00
4	Phase 2C Handover Completion	R 25,000.00
5	Phase 2D Handover Completion	R 25,000.00
6	Phase 2E Handover Completion	R 25,000.00
7	Phase 2A PLMS Handover	R 25,000.00
8	Phase 2B PLMS Handover	R 25,000.00
9	Phase 2C PLMS Handover	R 25,000.00



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		10	Phase 2D PLMS Handover	R 25,000.00
	Remainder of the <i>works</i>			R 25,000.00
X7	Delay damages			
X7.1	Delay damages for late Completion of the whole of the <i>works</i> are		See item X7.1 and X5.1 above. The parties agree that this constitutes a genuine pre-estimate of the damages.	
X13	Performance bond			
X13.1	The amount of the performance bond is		5% of the total of the Prices	
X16	Retention			
X16.1	The retention free amount is		Nil	
	The retention percentage is		10% on all payments certified. 50% of the retention is returned on a sectional completion basis, and the balance on the Defects date (Clause 42.2).	
X18	Limitation of liability			



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X18.1	The <i>Contractor's</i> liability to the Nil <i>Employer</i> for indirect or consequential loss is limited to:	
X18.2	For any one event, the <i>Contractor's</i> liability to the <i>Employer</i> for loss of or damage to the <i>Employer's</i> property is limited to:	The deductible of the relevant insurance policy
X18.3	The <i>Contractor's</i> liability for Defects due to his design which are not listed on the Defects Certificate is limited to:	The cost of correcting the Defect
X18.4	The <i>Contractor's</i> total liability to the <i>Employer</i> for all matters arising under or in connection with this contract, other than excluded matters, is limited to:	The Total of the Prices
X18.5	The <i>end of liability date</i> is	5 years after Completion of the whole of the works
Z	<i>Additional conditions of contract are:</i>	



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Z1 **Obligations in respect of Job Creation**

- Z1.1 It will be a material term of this contract that the *Contractor* must contribute to the *Employer's* job-creation objectives as set out in Returnable Schedule T2.2-12.
- Z1.2 The *Contractor's* undertaking as to the number of new jobs created due to the award of this contract as set out in Returnable Schedule T.2.2-12. will constitute a binding agreement throughout the duration of the contract until Completion, if not, it will be deemed that the *Contractor* has failed in full to meet this specific material term of the contract, which may constitute a reason for termination.
- Z1.3 The *Contractor* shall provide to the *Employer*, on a monthly basis or upon receiving an instruction to do so by the *Project Manager*, any documentation and/or evidence required by the *Employer*, which in the *Employer's* opinion would be necessary to verify whether the *Contractor* has maintained the job-creation undertaking as stipulated in Returnable Schedule T.2.2-12. The *Contractor* shall provide the said documentation and/or evidence within the period stated or as instructed. The provision of the documentation and/or evidence shall not constitute a compensation event.

Z2 **Additional clause relating to Performance Bonds and/or Guarantees**

- Z2.1 The Performance Guarantee under X13 above shall be an irrevocable, on-demand performance guarantee, to be issued exactly in the form of the Pro Forma documents provided for this purpose under C1.3 (Forms of Securities), in favour of the *Employer* by a financial institution reasonably acceptable to the *Employer*.
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Z3 Additional clauses relating to Joint Venture

Z3.1

Insert the additional core clause 27.5

27.5. In the instance that the *Contractor* is a joint venture, the *Contractor* shall provide the *Employer* with a certified copy of its signed joint venture agreement, and in the instance that the joint venture is an 'Incorporated Joint Venture,' the Memorandum of Incorporation, within 4 (four) weeks of the Contract Date.

The Joint Venture agreement shall contain but not be limited to the following:

- A brief description of the Contract and the Deliverables;
- The name, physical address, communications addresses and domicilium citandi et executandi of each of the constituents and of the Joint Venture;
- The constituent's interests;
- A schedule of the insurance policies, sureties, indemnities and guarantees which must be taken out by the Joint Venture and by the individual constituents;
- Details of an internal dispute resolution procedure;
- Written confirmation by all of the constituents:
 - i. of their joint and several liabilities to the *Employer* to Provide the Works;
 - ii. identification of the lead partner in the joint venture confirming the authority of the lead partner to bind the joint venture through the *Contractor's* representative;
 - iii. Identification of the roles and responsibilities of the constituents to provide the Works.



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		- Financial requirements for the Joint Venture: iv. the working capital requirements for the Joint Venture and the extent to which and manner whereby this will be provided and/or guaranteed by the constituents from time to time; v. the names of the auditors and others, if any, who will provide auditing and accounting services to the Joint Venture.
Z3.2		Insert additional core clause 27.6 27.6. The <i>Contractor</i> shall not alter its composition or legal status of the Joint Venture without the prior approval of the <i>Employer</i>.
Z4	Additional obligations in respect of Termination	
Z4.1		The following will be included under core clause 91.1: In the second main bullet, after the word 'partnership' add 'joint venture whether incorporate or otherwise (including any constituent of the joint venture)' and Under the second main bullet, insert the following additional bullets after the last sub-bullet: - commenced business rescue proceedings (R22) - repudiated this Contract (R23)
Z4.2	Termination Table	The following will be included under core clause 90.2 Termination Table as follows: Amend "A reason other than R1 – R21" to "A reason other than R1 – R23"



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Z4.3	Amend "R1 – R15 or R18" to "R1 – R15, R18, R22 or R23."
Z5	Right Reserved by the Employer to Conduct Vetting through SSA
Z5.1	The <i>Employer</i> reserves the right to conduct vetting through State Security Agency (SSA) for security clearances of any <i>Contractor</i> who has access to National Key Points for the following without limitations: 1. Confidential – this clearance is based on any information which may be used by malicious, opposing or hostile elements to harm the objectives and functions of an organ of state. 2. Secret – clearance is based on any information which may be used by malicious, opposing or hostile elements to disrupt the objectives and functions of an organ of state. 3. Top Secret – this clearance is based on information which may be used by malicious, opposing or hostile elements to neutralise the objectives and functions of an organ of state.
Z6	Additional Clause Relating to Collusion in the Construction Industry
Z6.1	The contract award is made without prejudice to any rights the <i>Employer</i> may have to take appropriate action later with regard to any declared tender rigging including blacklisting.
Z7	Additional Clause Relating to the Employer's rights to take appropriate action



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- Z7.1 The contract award is made without prejudice to any rights the *Employer* may have to take appropriate action later with regard to:
- Any declared, exposed or confirmed tender rigging.
- Z7.1.1 The Contractor further undertakes:
not to give or cause any offer, payment, consideration, or benefit of any kind, which constitutes or could be construed as an illegal or corrupt practice, either directly or indirectly, as an inducement or reward for the award or in execution of this contract.
- Z7.1.2 To comply with all laws, regulations or policies relating to the prevention and combating of bribery, corruption, and money laundering to which it or the Employer is subject, including but not limited to the Prevention and Combating of Corrupt Activities Act, 12 of 2004.
- Z7.1.3 The Contractor's breach of this clause constitutes grounds for terminating the Contractor's obligation to Provide the Services or taking any other action as appropriate against the Contractor (including civil or criminal action). However, lawful inducements and rewards shall not constitute grounds for termination.
- Z7.1.4 If the Contractor is found guilty by a competent court, administrative or regulatory body of participating in illegal or corrupt practices, including but not limited to the making of offers (directly or indirectly), payments, gifts, gratuity, commission or benefits of any kind, which are in any way whatsoever in connection with the contract with the Employer, the Employer shall be entitled to terminate the contract forthwith and take any other action as appropriate against the Contractor (including civil or criminal action).



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Z7.2	The contract award is made without prejudice to any rights the <i>Employer</i> may have to take appropriate action later with regard to:	Politically Exposed Persons including any allegations with regards to State Capture.
Z7.3	The contract award is made without prejudice to any rights the <i>Employer</i> may have to take appropriate action later with regard to:	Blacklisting by any State Entity on the National Treasury database.
Z8	Protection of Personal Information Act	
Z8.1		The <i>Employer</i> and the <i>Contractor</i> are required to process information obtained for the duration of the Agreement in a manner that is aligned to the Protection of Personal Information Act.
Z9	Time	
Z9.1		<i>Clause 33.2. is added as an additional clause.</i> The <i>Employer</i> may at any time suspend part or all of the <i>services</i>. As a consequence, if the <i>Contractor</i> is required to demobilise and then remobilise its staff and equipment, the <i>Contractor</i> will be reimbursed at cost. The <i>Contractor</i> will be required to reduce and mitigate all its costs during the period of suspension and will be entitled to compensation only to the extent that it can demonstrate it has incurred costs which were not capable of being mitigated.
Z10	Compensation Events	
Z10.1		Clause 61.4: The first bullet point is amended to read as follows: arises from the fault, error, negligence or default of the <i>Contractor</i> .
Z11	Limitation of liability	



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Z11.1	Add to core clause 82.1 and X18
	For the avoidance of doubt the parties expressly agree that the total liability of the <i>Contractor</i> to the <i>Employer</i> applies jointly and severally across all organisations comprising of the <i>Contractor</i> .
Z12	Additional clauses relating to cession of rights
Z12.1	The <i>Contractor</i> shall not cede any rights under this contract without the approval of the <i>Employer</i> .
Z12.2	The <i>Employer</i> may on written notice to the <i>Contractor</i> cede and assign its rights and obligations under this contract to any of its subsidiaries or any of its present divisions or operations which may be converted into separate legal entities as a result of the restructuring of the <i>Employer</i> .
Z13	Additional clauses relating to interpretation of the law
Z13.1	Add to core clause 12.3 Any extension, concession, waiver or relaxation of any action by the Parties, the <i>Employers' Agent</i> or <i>Adjudicator</i> does not constitute a waiver of rights and does not give rise to an Estoppel or Lien, unless the Parties agree otherwise and confirm such an agreement in writing.
Z14	<i>Employer's Step in rights</i>
Z14.1	If the <i>Contractor</i> defaults by failing to comply with his obligations and fails to remedy such default within 2 weeks of the notification of the default by the <i>Employer's Agent</i> , the <i>Employer</i> , without prejudice to his other rights, powers and remedies under the contract, may remedy the default either himself or procure a third party (including any <i>sub-Contractor</i> or supplier of the <i>Contractor</i>) to do so on his behalf. The reasonable costs of such remedial works shall be borne by the <i>Contractor</i> .



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Z14.2

The *Contractor* co-operates with the *Employer* and facilitates and permits the use of all required information, materials and other matter (including but not limited to documents and all other drawings, CAD materials, data, software, models, plans, designs, programs, diagrams, evaluations, materials, specifications, schedules, reports, calculations, manuals or other documents or recorded information (electronic or otherwise) which have been or are at any time prepared by or on behalf of the *Contractor* under the contract or otherwise for and/or in connection with any subsequent *works*) and generally does all things required by the *Employers' Agent* to achieve this end.

Z15 Intellectual Property (IP)

Z15.1

Firmware, System Software and Construction Languages

The Employer shall be granted, in respect of firmware, system software, and construction languages, a perpetual, non-exclusive license to install, load and run the software products in object code. This right is conferred to the Employer on the basis that software licenses for the firmware, system software and construction languages are paid.

The Employer will not be entitled to modify, reverse engineer, translate or disassemble this software, and/or modify, duplicate or reproduce the allied documentation, other than for training and maintenance purposes.



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Z15.2

Application Software:

The *Employer* shall be granted, in respect of application software, free and unrestricted use of the software which will include the following rights:

- Right to install, load and run such software perpetually on project related and future installations; and,
- Right to copy and alter code or have it modified by a third party for any reason without obtaining permission from the *Contractor*; and,
- To provide copies thereof to *Others* (third party *Contractors* or Contractors of the *Employer*) to be used by them for purposes of tendering, consultancy, or service delivery.

The *Contractor* shall retain the right to use and exploit such application software, also in modified form, provided that the information and know-how received from the *Employer* shall not be made accessible to any third party.

Z15.3

Works Related Design Documentation

The *Contractor* grants the *Employer* the right in accordance with the provisions of Section 22 of the Copyright Act 1978:

- To copy any plan, diagram, drawing, document, specification, bill of quantities, design, calculation, or any other similar document made by the *Contractor* in connection with the *Works*; and,
- To make free and unrestricted use thereof for its own purposes, modify same or have it modified by a third party for any reasons, without obtaining permission from the *Contractor*; and,
- To provide copies thereof to *Others* (third party *Contractors* or Contractors of the *Employer*) to be used by them for purposes of tendering, consultancy or service delivery.



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Z15.4

Using the *Contractor's* Design

The *Employer* shall have the right to use and copy all, or any part, of the *Contractor's* design for any purpose connected with construction, use, maintenance, alteration, demolition, expansion to the *Works*, or for integration of the *Works* with other systems, plant and equipment.

Related Definitions	
Term	Definition
Application Software	(1) Software designed to fulfil specific needs of a user; for example, software for navigation, payroll, or process control. (2) Software that is specific to an application and is composed of programs, data, and documentation. [Extract from IEEE100] (3) Software specifically developed for the project as part of the works, which will include but is not limited to Process Control System Libraries, Process Control Application software (SCADA and PLC), Metering and Pipeline Monitoring Software.
Construction Language	Construction languages include all forms of communication by which a human can specify an executable problem solution to a computer. The simplest type of construction language is a configuration language, in which software engineers choose from a limited set of predefined options to create new or custom software installations. The text-based configuration files used in both the Windows and Unix operating systems are examples of this, and the menu style selection lists of some program generators constitute another. Toolkit languages are used to build applications out of toolkits (integrated sets of application-specific reusable parts), and are more complex than configuration languages. Toolkit languages may be explicitly defined as application programming languages (for example, scripts), or may simply be implied by the set of interfaces of a toolkit. Programming languages are the most flexible type of construction languages. They also contain the least amount of information about specific application areas and development processes, and so require the most training and skill to use effectively. [From IEEE SWEBOOK]
Firmware	(1) (software) The combination of a hardware device and computer instructions and data that reside as read-only software on that device. (2) (supervisory control, data acquisition, and automatic control) Hardware used for the non-volatile storage of instructions or data that can be read only by the computer. Stored information is not alterable by any computer program. (3) The combination of software and data that reside on read-only memory. (4) A program, typically stored in read-only memory, that controls a computer from the time that it is turned on until the time that the primary operating system assumes control of the computer. [Extract from IEEE100]

Z16

Phase 1: Development (Design Review by the *Employer*)



DESCRIPTION OF THE WORKS: FOR THE PROVISION OF DESIGN, ENGINEERING, SUPPLY, PROCUREMENT, FABRICATION, SOFTWARE DEVELOPMENT, TESTING, INSTALLATION, COMMISSIONING AND HANDOVER OF PROCESS CONTROL, INTEGRATED CUSTODY METERING AND PIPELINE MONITORING SYSTEMS TO ALL INLAND STATIONS, MASTER, AND SECONDARY CONTROL CENTRES –
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Z16.1

Upon completion of the Development Phase deliverables, a formal design review shall be conducted. At the design review, the Owners Team shall, based on the presented deliverables:

- Assess if the technical requirements have been complied with; and
- Assess if the technical solution can be practically operated, maintained and adequately supported in the Employers' South African operating and maintenance environment;
- Assess, based on the Contractor's development and execution performance, if the risks associated with the remainder of Works is tolerable; and
- Assess if the Contractor has sufficient competent resources to complete multiple work streams during Phases 1 and 2.

Failure to comply with any of the above criteria shall entitle the Employer to terminate the Contractor's obligation to provide the remainder of the *Works* without any further entitlement to the Contractor for any payment or consideration with regards to the provision off the remainder of the work contracted for.

Z17 **Phase 2B, 2C: Development
(Design Review by the
Employer)**



DESCRIPTION OF THE WORKS: FOR THE PROVISION OF DESIGN, ENGINEERING, SUPPLY, PROCUREMENT, FABRICATION, SOFTWARE DEVELOPMENT, TESTING, INSTALLATION, COMMISSIONING AND HANDOVER OF PROCESS CONTROL, INTEGRATED CUSTODY METERING AND PIPELINE MONITORING SYSTEMS TO ALL INLAND STATIONS, MASTER, AND SECONDARY CONTROL CENTRES – **MAIN AUTOMATION CONTRACT.**

Z17.1	Upon completion of Execution Phase 2B and Phase 2C, a formal Owners Team design review shall be conducted. At the design review, the Owners Team shall, based on the presented deliverables: • Assess if the technical requirements have been complied with; • Assess if the technical solution can be practically operated, maintained, and adequately supported in the Employers' South African operating and maintenance environment; AND • Assess, based on the Contractor's development and execution performance, if the risks associated with the remainder of Works is tolerable; AND • Assess if the Contractor has sufficient resources to complete multiple streams during Phase 2. Failure to comply with all the above criteria will entitle the Employer to terminate the Contractor's obligation to provide the remainder of the <i>Works</i> without any further entitlement to the Contractor for any payment or consideration with regards to the provision off the remainder of the work contracted for.
Z18 Access to the OEM Centres of Excellence Z18.1	The <i>Contractor</i> shall ensure, promote and facilitate unrestricted, direct access by the <i>Employer</i> to the respective OEM Centres of Excellence for the systems offered.
Z19 Provisional Cost Sums Z19.1	Provisional Cost (PC) Sums contained in the Option A - Activity Contract Pricing Schedule are owned by the Employer and may be used at the sole discretion of the Employer.
Z20 Restraint of Trade	



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Z20.1

Below are *additional conditions of contract* in respect of Subcontracting clause 26.3 regarding *Project Manager's* reason for not accepting them is that:

- The terms of the proposed subcontract preclude the *Employer* from engaging directly with any or all Subcontractors for any future work outside this contract.
- The IP rights concluded in this main contract do not flow down to the proposed subcontracting conditions of contract.

Z21 Contract Hedging

Z21.1

Parties herein agree that the final Total of the Prices and value will be finalized within 48 hours of contract award date. The forward rates are to be confirmed and accepted by Transnet SOC Limited Treasury. To this end a compensation event will be issued to cover the Euro value conversion to Rand value equivalent.



DESCRIPTION OF THE WORKS: FOR THE PROVISION OF DESIGN, ENGINEERING, SUPPLY, PROCUREMENT, FABRICATION, SOFTWARE DEVELOPMENT, TESTING, INSTALLATION, COMMISSIONING AND HANDOVER OF PROCESS CONTROL, INTEGRATED CUSTODY METERING AND PIPELINE MONITORING SYSTEMS TO ALL INLAND STATIONS, MASTER, AND SECONDARY CONTROL CENTRES – **MAIN AUTOMATION CONTRACT.**

Z22 Additional clauses relating to Partnership

Z22.1

In the instance that the *Contractor* is in Partnership, the *Contractor* shall provide the *Employer* with a certified copy of its signed Partnership agreement, and in the instance that the joint venture is an 'Incorporated Partnership,' the Memorandum of Incorporation, within 4 (four) weeks of the Contract Date.

The Partnership agreement shall contain but not be limited to the following:

- A brief description of the Contract and the Deliverables;
- The name, physical address, communications addresses and domicilium citandi et executandi of each of the constituents and of the Partnership;
- The constituent's interests;
- A schedule of the insurance policies, sureties, indemnities and guarantees which must be taken out by the Partnership and by the individual constituents;
- Details of an internal dispute resolution procedure;
- Written confirmation by all of the constituents:
 - vi.** of their Partnership and several liabilities to the *Employer* to Provide the Works;
 - vii.** identification of the lead partner in the Partnership confirming the authority of the lead partner to bind the Partnership through the *Contractor's* representative;
 - viii.** Identification of the roles and responsibilities of the constituents to provide the Works.
- Financial requirements for the Partnership the working capital requirements for the



DESCRIPTION OF THE WORKS: FOR THE PROVISION OF DESIGN, ENGINEERING, SUPPLY, PROCUREMENT, FABRICATION, SOFTWARE DEVELOPMENT, TESTING, INSTALLATION, COMMISSIONING AND HANDOVER OF PROCESS CONTROL, INTEGRATED CUSTODY METERING AND PIPELINE MONITORING SYSTEMS TO ALL INLAND STATIONS, MASTER, AND SECONDARY CONTROL CENTRES –
MAIN AUTOMATION CONTRACT.

Partnership and the extent to which and manner whereby this will be provided and/or guaranteed by the constituents from time to time;

- ix.** the names of the auditors and others, if any, who will provide auditing and accounting services to the Partnership.



DESCRIPTION OF THE WORKS: FOR THE PROVISION OF DESIGN, ENGINEERING, SUPPLY, PROCUREMENT, FABRICATION, SOFTWARE DEVELOPMENT, TESTING, INSTALLATION, COMMISSIONING AND HANDOVER OF PROCESS CONTROL, INTEGRATED CUSTODY METERING AND PIPELINE MONITORING SYSTEMS TO ALL INLAND STATIONS, MASTER, AND SECONDARY CONTROL CENTRES – **MAIN AUTOMATION CONTRACT.**

C1.2 Contract Data

Part two - Data provided by the *Contractor*

The tendering *Contractor* is advised to read both the NEC3 Engineering and Construction Contract - June 2005 (with amendments June 2006 and April 2013) and the relevant parts of its Guidance Notes (ECC3-GN) in order to understand the implications of this Data which the tenderer is required to complete. An example of the completed Data is provided on pages 156 to 158 of the ECC3 Guidance Notes.

Completion of the data in full, according to Options chosen, is essential to create a complete contract.

Clause	Statement	Data
10.1	The <i>Contractor</i> is (Name):	
	Address	
	Tel No.	
	Fax No.	
11.2(8)	The <i>direct fee percentage</i> is	%
	The <i>subcontracted fee percentage</i> is	%
11.2(18)	The <i>working areas</i> are the Site and	
24.1	The <i>Contractor's</i> key persons are:	
	1 Name:	
	Job:	
	Responsibilities:	
	Qualifications:	
	Experience:	
	2 Name:	
	Job	
	Responsibilities:	
	Qualifications:	



DESCRIPTION OF THE WORKS: FOR THE PROVISION OF DESIGN, ENGINEERING, SUPPLY, PROCUREMENT, FABRICATION, SOFTWARE DEVELOPMENT, TESTING, INSTALLATION, COMMISSIONING AND HANDOVER OF PROCESS CONTROL, INTEGRATED CUSTODY METERING AND PIPELINE MONITORING SYSTEMS TO ALL INLAND STATIONS, MASTER, AND SECONDARY CONTROL CENTRES – **MAIN AUTOMATION CONTRACT.**

	Experience:	
		CV's (and further key persons data including CVs) are appended to Tender Schedule entitled_____
11.2(14)	The following matters will be included in the Risk Register	
31.1	The programme identified in the Contract Data is	
A	Priced contract with activity schedule	
11.2(20)	The <i>activity schedule</i> is in	Part C2.4
11.2(30)	The tendered total of the Prices is	(in figures) (in words), excluding VAT
	Data for Schedules of Cost Components	<i>Note "SCC" means Schedule of Cost Components starting on page 60 of ECC, and "SSCC" means Shorter Schedule of Cost Components starting on page 63 of ECC.</i>
A	Priced contract with activity schedule	Data for the Shorter Schedule of Cost Components
41 in SSCC	The percentage for people overheads is:	%
21 in SSCC	The published list of Equipment is the last edition of the list published by	
	The percentage for adjustment for Equipment in the published list is	% (state plus or minus)
22 in SSCC	The rates of other Equipment are:	Equipment
		Size or capacity
		Rate



DESCRIPTION OF THE WORKS: FOR THE PROVISION OF DESIGN, ENGINEERING, SUPPLY, PROCUREMENT, FABRICATION, SOFTWARE DEVELOPMENT, TESTING, INSTALLATION, COMMISSIONING AND HANDOVER OF PROCESS CONTROL, INTEGRATED CUSTODY METERING AND PIPELINE MONITORING SYSTEMS TO ALL INLAND STATIONS, MASTER, AND SECONDARY CONTROL CENTRES –
MAIN AUTOMATION CONTRACT.

61	in	The hourly rates for Defined Cost of design outside the Working Areas are	Category of employee	Hourly rate
62	in	The percentage for design overheads is	%	
SSCC				
63	in	The categories of design employees whose travelling expenses to and from the Working Areas are included in Defined Cost are:		
SSCC				

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Part C2: Pricing Data



DESCRIPTION OF THE WORKS: FOR THE PROVISION OF DESIGN, ENGINEERING, SUPPLY, PROCUREMENT, FABRICATION, SOFTWARE DEVELOPMENT, TESTING, INSTALLATION, COMMISSIONING AND HANDOVER OF PROCESS CONTROL, INTEGRATED CUSTODY METERING AND PIPELINE MONITORING SYSTEMS TO ALL TRANSNET PIPELINES INLAND STATIONS, MASTER, AND SECONDARY CONTROL CENTRES – **MAIN AUTOMATION CONTRACT**.

PART 2: PRICING DATA

Document reference	Title	No of pages
C2.1	Pricing instructions: Option A	
C2.2	Activity Schedule	



DESCRIPTION OF THE WORKS: FOR THE PROVISION OF DESIGN, ENGINEERING, SUPPLY, PROCUREMENT, FABRICATION, SOFTWARE DEVELOPMENT, TESTING, INSTALLATION, COMMISSIONING AND HANDOVER OF PROCESS CONTROL, INTEGRATED CUSTODY METERING AND PIPELINE MONITORING SYSTEMS TO ALL TRANSNET PIPELINES INLAND STATIONS, MASTER, AND SECONDARY CONTROL CENTRES – **MAIN AUTOMATION CONTRACT**.

C2.1 Pricing Instructions: Option A

1. The *conditions of contract*

1.1. How the contract prices work and assesses it for progress payments

Clause 11 in NEC3 Engineering and Construction Contract, June 2005, (with amendments June 2006 and April 2013) (ECC) Option A states:

Identified and defined terms 11

11.2 (20) The Activity Schedule is the *activity schedule* unless later changed in accordance with this contract.

(22) Defined Cost is the cost of the components in the Shorter Schedule of Cost Components whether work is subcontracted or not excluding the cost of preparing quotations for compensation events.

(27) The Price for Work Done to Date is the total of the Prices for

- each group of completed activities and
- each completed activity which is not in a group

A completed activity is one which is without Defects which would either delay or be covered by immediately following work.

(30) The Prices are the lump sums for each of the activities on the Activity Schedule unless later changed in accordance with this contract.

1.2. Measurement and Payment

1.2.1 The Activity Schedule provides the basis of all valuations of the Price for Work Done to Date, payments in multiple currencies, price adjustments for inflation and general progress monitoring.

1.2.2 The amount due at each assessment date is based on **completed activities and/or milestones** as indicated on the Activity Schedule.

1.2.3 The Activity Schedule work breakdown structure provided by the *Contractor* is based on the Activity Schedule provided by the *Employer*. The activities listed by the *Employer* are the minimum activities acceptable and identify the specific activities which are required to achieve Completion. The activity schedule work breakdown structure is compiled to the satisfaction of the *Project Manager* with any additions and/or amendments deemed necessary.

1.2.4 The *Contractor's* detailed Activity Schedule summates back to the Activity Schedule provided by the *Employer* and is in sufficient detail to monitor completion of activities related to the Accepted Programme in order that payment of completed activities may be assessed.



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- 1.2.5 The short descriptions in the Activity Schedule are for identification purposes only. All work described in the *Works* Information is deemed included in the activities.
- 1.2.6 The Activity Schedule is integrated with the Prices, Accepted Programme and where required the forecast rate of payment schedule.
- 1.2.7 Activities in multiple currencies are separately identified on both the Activity Schedule and the Accepted Programme for each currency.
- 1.2.8 The tendered total of the prices as stated in the Contract Data is obtained from the Activity Schedule summary. The tendered total of the prices includes for all direct and indirect costs, overheads, profits, risks, liabilities and obligations relative to the Contract, including price adjustments for inflation.



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C2.2 Activity Schedule

The *Employer's* Activity Schedule may be found in Appendix F of the Tender Documentation. The *Contractor* must complete the attached spread sheet (MAC Activity Schedule H373204-0000-300-076-0001 Rev 0) in Excel format.

The Activity Schedule indicates the minimum activities which the *Employer* has identified. The *Contractor* may add additional activities, update, add or amend this Activity Schedule; based on revised activities, different project resources, total manhour estimates and different project execution strategies, taking into consideration previous experience and their view of the project.

INLAND NETWORK UPGRADE PROJECT	Total Cost ZAR	Comments
PRICING SCHEDULE SUMMARY		
Total	R0	
Phase 1: DEVELOPMENT	R0	
Prj Mgt, Quality, Safety	R0	
Project Setup	R0	
Engineering & Software Development	R0	
Phase 2: MULTI-STATION EXECUTION	R0	
Phase 2: MCC, SCC, HMI	R0	
Prj Mgt, Quality, Safety	R0	
PCS/CMS System Engineering	R0	
Multi-Station Execution	R0	
Equipment, Hardware and Software Licensing	R0	
Project Closeout	R0	
Phase 2A: APT, MTN, ALR-AV	R0	
Prj Mgt, Quality, Safety	R0	
Engineering	R0	
Execution	R0	
Supply	R0	
Project Closeout	R0	
Phase 2B: RTR, LLA, TLR, ALR-MP	R0	
Prj Mgt, Quality, Safety	R0	
Engineering	R0	
Execution	R0	
Supply	R0	
Project Closeout	R0	
Phase 2C: WIR, WAO, KDL, SEC	R0	
Prj Mgt, Quality, Safety	R0	
Engineering	R0	
Execution	R0	
Supply	R0	
Project Closeout	R0	
Phase 2D: SBG, KRP	R0	
Prj Mgt, Quality, Safety	R0	
Engineering	R0	
Execution	R0	
Supply	R0	
Project Closeout	R0	
Phase 2E: TLR IRP	R0	
Prj Mgt, Quality, Safety	R0	
Engineering	R0	
Execution	R0	
Supply	R0	
Project Closeout	R0	
Phase 2: PLMS EXECUTION	R0	
Phase 2A: PLMS	R0	
Prj Mgt, Quality, Safety	R0	
PLMS Software Development	R0	
Installation, Commissioning and Tuning	R0	
Handover	R0	
Phase 2B: PLMS	R0	
Prj Mgt, Quality, Safety	R0	
PLMS Software Development	R0	
Installation, Commissioning and Tuning	R0	
Handover	R0	
Phase 2C: PLMS	R0	
Prj Mgt, Quality, Safety	R0	
PLMS Software Development	R0	
Installation, Commissioning and Tuning	R0	
Handover	R0	
Phase 2D: PLMS	R0	
Prj Mgt, Quality, Safety	R0	
PLMS Software Development	R0	
Installation, Commissioning and Tuning	R0	
Handover	R0	
PC Sum Items: For Employer's Allocation	R70,000,000	
E&I Installation Subcontracts	R50,000,000	
System Spares	R20,000,000	

App C1 Reference	DEVELOPMENT PHASE 1	Total Cost ZAR	Portion of Cost ZAR	Portion of Cost USD	Works Information Reference	Comments
	NEC3 ECC Option A: Priced Contract with activity schedule					
	Phase 1: Total					
	Phase 1: Project, Quality and Safety Management Total					
	Phase 1: Project Setup Total					
	Phase 1: Engineering & Software Development Total					
	Project, Quality and Safety Management	R0	R0	\$0		
1.01	Project, Quality and Safety Management	R0	R0	\$0	Section 4.1.3.1	
	Monthly Programme (Schedule) Update					Payment to be equally apportioned across the full duration of the Phase.
	Monthly Cost Report					Payment to be equally apportioned across the full duration of the Phase.
	Monthly Cashflow Forecast					Payment to be equally apportioned across the full duration of the Phase.
	Monthly Project Risk Register Update					Payment to be equally apportioned across the full duration of the Phase.
	Monthly Document Register Update					Payment to be equally apportioned across the full duration of the Phase.
	Monthly Progress Report					Payment to be equally apportioned across the full duration of the Phase.
	Monthly Quality Management Report					Payment to be equally apportioned across the full duration of the Phase.
	Monthly Progress of QCP's					Payment to be equally apportioned across the full duration of the Phase.
	Monthly Quality Management Report					Payment to be equally apportioned across the full duration of the Phase.
	Project Setup	R0	R0	\$0		
1.02	Project Setup	R0	R0	\$0	Section 4.1.3.2	
	Kick-off Workshop					
	Site familiarisation visits					
	Setup Cost Management System					
	Setup Document Management System					
	Project Execution Plan and Supporting Procedures					
	Baseline Schedule and basis of Schedule (Programme)					
	Project Safety Management Plan					
	Project Safety File					
	Project Quality Management Plan					
	Software Lifecycle Plan (SLCP)					
	Software Configuration Management Plan (SCMP)					
	Project Risk Register (Baseline)					
	Prepare Development Phase QCP's					
	Prepare Execution Phase QCP's					
1.03	PCS/CMS/PLMS Development Staging System	R0	R0	\$0	Section 4.1.3.3	
	Establishes Staging System for development, testing and configuration of the Station/NOC PCS/CMS/LDS Software					Details in Supply BOQ
	Staging System Detail Design Specification					
	Engineering & Software Development	R0	R0	\$0		
1.04	PCS/CMS Global System Design	R0	R0	\$0	Section 4.1.3.4	
	Station SCADA Architectures (14x)					There are 13 sites, but ALR will have two separate control systems, installations, commissioning and handovers (14x systems + MCC + SCC)
	Station PLC Architectures (14x)					There are 13 sites, but ALR will have two separate control systems, installations, commissioning and handovers (14x systems + MCC + SCC)
	SCC SCADA Architecture					
	NOC SCADA Architecture					
	HMI Trainer SCADA Architecture					
	OASyS Documentation as per Table 1-2 (updates)					
	AES Documentation as per Table 1-2, using OASyS Documents as a basis (new)					
	Gap Analysis Report for TPL Control Module Library					
	Deployment Strategy (OASyS 2018)					
	Deployment Strategy (HMI Trainer)					
	ISA 62443\Cyber Security Plan\Specification					
	ISA 62443\Cyber Security High Level Risk Assessment					
	ISA 62443\Cyber Security Vulnerability Risk Assessment					
	ISA 62443\Cyber Security Cyber Risk Assessment					
	ISA 62443\Cyber Security Zoned Architecture					
	ISA 62443\Cyber Security Compliance Assessment Report					
	API1164 Rev3\Security Compliance Assessment Report					
1.05	PCS/CMS Global Software Development - Control Modules	R0	R0	\$0	Section 4.1.3.5	
	OASyS 2018 Control Module Software Library Code (SCADA, PLC)					
	AES202x Control Module Software Library Code (SCADA, PLC)					
	AES Control Module Specification					
1.06	PCS/CMS Global Software Development - Tank Gauging	R0	R0	\$0	Section 4.1.3.5.3	
	Tank Gauging and Tank State Source Code and Binaries					
	AES Integrated HMI Style Guide					
	AES SCADA System FDS					

App C1 Reference	DEVELOPMENT PHASE 1	Total Cost ZAR	Portion of Cost ZAR	Portion of Cost USD	Works Information Reference	Comments
	NEC3 ECC Option A: Priced Contract with activity schedule					
	Phase 1: Total	R0	R0	\$0		
	Phase 1: Project, Quality and Safety Management Total	R0	R0	\$0		
	Phase 1: Project Setup Total	R0	R0	\$0		
	Phase 1: Engineering & Software Development Total	R0	R0	\$0		
	AES Metering FDS					
	AES PCS Report Plan					
	AES Control Module Specification					
	Tank Gauging System ICD					
1.07	PCS/CMS Global Software Development - Host and Custody Metering	R0	R0	\$0	Section 4.1.3.5.4	
	Host Metering Source Code and Binaries					
	Custody Metering Source Code and Binaries					
	AES Integrated HMI Style Guide					
	AES Metering FDS					
	AES Metering – SAP ICD					
	AES PCS Report Plan					
	AES Control Module Specification					
	AES S600+ ICD (update)					
1.08	PCS/CMS Global Software Testing	R0	R0	\$0	Section 4.1.3.6	
	Control Module Software Test Plans					
	Control Module Library SCADA and PLC Software Testing					
	AES Control Module Thin slice Records					
	Control Module Software iFAT Records					
	Control Module Software cFAT Records					
	Tank Gauging Software Test Plans					
	Tank Gauging SCADA and PLC Software Testing					
	Tank Gauging Thin slice Records					
	Tank Gauging Software iFAT Records					
	Tank Gauging Software cFAT Records					
	Host Metering SCADA and PLC Software Testing					
	Host Metering Software Test Plans					
	Host Metering Thin slice Records					
	Host Metering Software iFAT Records					
	Host Metering Software cFAT Records					
1.09	PLMS Global System Design	R0	R0	\$0	Section 4.1.3.7	
	Inland Network Simplified Process Flow Diagrams (14x)					There are 13 sites, but ALR will have two separate control systems, installations, commissioning and handovers (14x systems + MCC + SCC)
	OASyS Leak Detection FDS (Update)					
	AES PLMS FDS					
	OASyS\AES Atmos ICD					
	PCS7 ICD					
	PLMS Deployment Plan					
1.10	Field E&I Installation Works for all Inland Stations/NOC/SCC	R0	R0	\$0	Section 4.1.3.8	
	E&I Installation Site Assessments (17x)					
	E&I Installation Scope of Work (17x)					
	E&I Installation RFP					
	E&I Installation Tender Adjudication					
1.11	Procurement - Long Lead Items	R0	R0	\$0	Section 4.1.3.9	
	Materials Management Schedule					
	Procurement Tracking Register					
	Emerson S600+ Flow Computers					Costs allocated to Phase 2 activity schedule
	PLC Hardware					Costs allocated to Phase 2 activity schedule
	System hardware, software and licenses					Costs allocated to Phase 2 activity schedule
1.12	Employer’s Design Review	R0	R0	\$0	Section 4.1.4	
	System Compliance Matrix					

EXECUTION PHASE 2: MULTI-STATION		Totals			Phase 2			Phase 2A			Phase 2B				Phase 2C		
		Total Cost ZAR	Portion of Cost ZAR	Portion of Cost USD	MCC ZAR	SCC ZAR	HMI Trainer ZAR	Airport ZAR	Meyerton ZAR	Alrode Avtur ZAR	Rustenburg ZAR	Langlaagte ZAR	Tarlton ZAR	Alrode Multi-Product ZAR	Witbank ZAR	Waltloo ZAR	Kendal ZAR
NEC3 ECC Option A: Priced Contract with activity schedule																	
App C2 Reference	Phase 2: Total	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Phase 2: Project, Quality and Safety Management	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Phase 2: PCS/CMS System Engineering	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Phase 2: Multi-Station Execution	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Phase 2: Equipment, Hardware and Software Licensing	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Phase 2: Project Closeout	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Project, Quality and Safety Management	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
2.01	Project, Quality and Safety Management	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Monthly Programme (Schedule) Update	R0															
	Monthly Cost Report	R0															
	Monthly Cashflow Forecast	R0															
	Monthly Project Risk Register Update	R0															
	Monthly Progress Report	R0															
	Site Safety Files	R0															
	Procurement Tracking Register (Update)	R0															
	Materials Management Register (Update)	R0															
	Monthly Progress of QCP's	R0															
	Monthly Quality Management Report	R0															
	Monthly Document and Drawing Register Update	R0															
	Management and supervision of E&I Installation Works	R0															
	PCS/CMS System Engineering	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
2.02	PCS/CMS System Engineering (Inland Stations)	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	SCADA Architecture Designs (14x)	R0															
	PLC Architecture Designs (14x)	R0															
	Network Topology Designs (14x)	R0															
	PCS BOQs (14x)	R0															
	Field Equipment BOQs (14x)	R0															
	Station PLC FDS (14x)	R0															
	OASys 2018 SCADA FDS	R0															
	AES202x SCADA FDS	R0															
	Station Software License Register (14x)	R0															
	Station Configuration Sheets (14 sets)	R0															
	Commissioning and Maintenance Spares Lists	R0															
	Station PCS/CMS EDS (13x) (Redline)	R0															
	Range, Alarm and Trip Schedules (14x) (Redline)	R0															
	IO Lists (14x) (Redline)	R0															
2.03	PCS/CMS System Engineering (MCC)	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	SCADA Architecture Designs (1 set)	R0															
	Network Topology Designs (1 set)	R0															
	PCS BOQs (1x)	R0															
	OASys 2018 SCADA FDS	R0															
	AES202x SCADA FDS	R0															
	MCC Software License Register (1 set)	R0															
	MCC Configuration Sheets (1 sets)	R0															
	Videowall Patching and Topology (1x) (update)	R0															
	Firewall Configuration and specification (update)	R0															
	Commissioning and Maintenance Spares Lists (1x)	R0															
	Diagnostics Systems FDS	R0															
2.04	PCS/CMS System Engineering (SCC)	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	SCADA Architecture Designs (1 set)	R0															

EXECUTION PHASE 2: MULTI-STATION		Totals			Phase 2			Phase 2A			Phase 2B				Phase 2C		
		Total Cost ZAR	Portion of Cost ZAR	Portion of Cost USD	MCC ZAR	SCC ZAR	HMI Trainer ZAR	Airport ZAR	Meyerton ZAR	Alrode Avtur ZAR	Rustenburg ZAR	Langlaagte ZAR	Tarlton ZAR	Alrode Multi-Product ZAR	Witbank ZAR	Waltloo ZAR	Kendal ZAR
NEC3 ECC Option A: Priced Contract with activity schedule																	
	Network Topology Designs (1 set)	R0															
	PCS BOQs (1x)	R0															
	Desk Patching Topology	R0															
	SCC Software License Register(1 set)	R0															
	SCC Configuration Sheets (1 set)	R0															
2.05	PCS/CMS System Engineering (HMI Trainer)	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	SCADA\PLC (soft) Architecture Designs	R0															
	Network Topology Designs	R0															
	PCS BOQs (1x)	R0															
	AES HMI Trainer FDS	R0															
	HMI Trainer Configuration Sheets	R0															
	HMI Trainer OASyS\AES2x Changeover Procedure	R0															
2.06	Procurement – General (Inland Stations/ MCC/ SCC/ Transnet Academy)	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Material Management Schedule	R0															
	Procurement Tracking Register	R0															
	DDS updates (with Vendor data)	R0															
2.07	Procurement, Fabrication, Testing, Delivery of Panels (Inland Stations/ MCC/SCC)	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Design Documentation (update/redline)	R0															
	Hardware Panel FAT Procedure	R0															
	Hardware and Panel iFATs Record	R0															
	Hardware and Panel cFATs Record	R0															
	Anomaly Lists and Correction Records	R0															
2.08	Avtur/MCC PCS/CMS Software Design, Development, Testing, and Integration Testing	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	OASyS PLC FDS (3x)	R0															
	OASyS SCADA FDS (1x) (update)	R0															
	All affected PCS system documentation (1 set)	R0															
	Station Masterfile	R0															
	Flow Computer Configuration Records	R0															
	Equipment Check sheets	R0															
	Station MODBUS Map (3x)	R0															
	Staged OASyS 2018 System	R0															
	Avtur Station software Backups	R0															
	Station IO List (redline)	R0															
	Station EDS (redline)	R0															
	Station RAT (redline)	R0															
	Alarm Database (redline)	R0															
	Station PLC Code Review Report (3x)	R0															
	Station SCADA Code Review Report (3x)	R0															
	SCADA HMI Graphics Report incl. Line wide graphics (3x)	R0															
	FAT Procedure (3x)	R0															
	Thin slice Records	R0															
	iFAT Records (3x)	R0															
	cFAT Records (3x)	R0															
	Anomaly Lists and Correction Records	R0															
2.09	Inland Station/MCC PCS/CMS Software Design, Development, Testing, and Integration Testing	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	AES202x PLC FDS (11x)	R0															
	AES202x SCADA FDS (1x)	R0															
	All affected PCS system documentation (1 set)	R0															
	Station Masterfile	R0															
	Flow Computer Configuration Records	R0															
	Equipment Check sheets	R0															
	Station MODBUS Map (11x)	R0															
	Staged AES202x System	R0															
	Station software Backups	R0															
	Station IO List (redline)	R0															
	Station EDS (redline)	R0															
	Station RAT (redline)	R0															
	Alarm Database (redline)	R0															
	Station PLC Code Review Report (11x)	R0															
	Station SCADA Code Review Report (11x)	R0															

EXECUTION PHASE 2: MULTI-STATION		Totals			Phase 2			Phase 2A			Phase 2B				Phase 2C		
		Total Cost ZAR	Portion of Cost ZAR	Portion of Cost USD	MCC ZAR	SCC ZAR	HMI Trainer ZAR	Airport ZAR	Meyerton ZAR	Alrode Avtur ZAR	Rustenburg ZAR	Langlaagte ZAR	Tarlton ZAR	Alrode Multi-Product ZAR	Witbank ZAR	Waltloo ZAR	Kendal ZAR
	NEC3 ECC Option A: Priced Contract with activity schedule																
	SCADA HMI Graphics Report incl. Line wide graphics (11x)	R0															
	FAT Procedure (11x)	R0															
	Thin slice Records	R0															
	iFAT Records (11x)	R0															
	cFAT Records (11x)	R0															
	Anomaly Lists and Correction Records	R0															
	Multi-Station Execution	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
2.10	Inland Station Installation, Changeover and Commissioning	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Station Masterfile	R0															
	Station Integration Procedure (14x)	R0															
	Station System Change-over plan (1x)	R0															
	Station Commissioning Plan (14x)	R0															
	Shutdown Readiness SOP (14x)	R0															
	Commissioned System	R0															
	Station software Backups	R0															
	E&I Installation Works (14x)	R0															
	Electrical CoCs (14x)	R0															
	Station IO List (redline)	R0															
	Station EDS (redline)	R0															
	Station RAT (redline)	R0															
	Alarm Database (redline)	R0															
	Station SAT Procedure (14x)	R0															
	SAT Records (14x)	R0															
	Anomaly Lists and Correction Records	R0															
	PCS/CMS System Performance SAT Records (14x)	R0															
2.11	MCC, SCC Installation, Changeover and Commissioning	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Station Masterfile	R0															
	MCC Integration Procedure (1x)	R0															
	MCC System Changeover Plan (1x)	R0															
	Commissioned System	R0															
	PLMS System	R0															
	MCC software Backups	R0															
	Diagnostic Tool (Acronis, MS Audit, Version Tool) Configuration	R0															
	E&I Installation Works (2x)	R0															
	Electrical CoCs (2x)	R0															
	MCC, SCC SAT Procedure (1x)	R0															
	SAT Records (1x)	R0															
	PLMS SAT Procedure (1x) (per segment)	R0															
	PLMS SAT Records (1x) (per segment)	R0															
	Anomaly Lists and Correction Records	R0															
	PCS/CMS System Performance SAT Records (1x)	R0															
2.12	Inland Station/MCC/SCC Handover	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	System Data Pack (14x + 2x)	R0															
2.13	Operational Readiness: Operations Training	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Operating and Maintenance Manuals (3 sets)	R0															
	Equipment Manuals (3 sets)	R0															
	Operations Train-the Trainer Training Course Material (2 sets)	R0															
	Update of TPL existing system specific procedures and/or work instructions	R0															
	Operations manuals for each system	R0															
	Operations train-the-trainer training course presentation media.	R0															
	Provision of 1x Trainer Course on PCS/CMS/PLMS: 2 persons, 3 days.	R0															
	Provision of PLMS Training Course for 3 x Senior Coordinating Officers: 1 day each.	R0															

EXECUTION PHASE 2: MULTI-STATION		Totals			Phase 2			Phase 2A			Phase 2B				Phase 2C		
		Total Cost ZAR	Portion of Cost ZAR	Portion of Cost USD	MCC ZAR	SCC ZAR	HMI Trainer ZAR	Airport ZAR	Meyerton ZAR	Alrode Avtur ZAR	Rustenburg ZAR	Langlaagte ZAR	Tarlton ZAR	Alrode Multi-Product ZAR	Witbank ZAR	Waltloo ZAR	Kendal ZAR
	NEC3 ECC Option A: Priced Contract with activity schedule																
2.14	Operational Readiness: Technical Training	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Technical and Maintenance Manuals (3 set)	R0															
	Equipment Manuals (3 set)	R0															
	AVEVA Enterprise SCADA Intermediate Course Workshop	R0															
	AVEVA Enterprise SCADA Advanced Course Workshop	R0															
	Schneider EcoStruxure Control Expert Programming course (10 people)	R0															
	PCS Project-tailored technical training courses	R0															
2.15	Maintenance and Support	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Maintenance & Support Agreement (SLA)	R0															
2.16	HMI Training System - Staging and Development	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	AES202x HMI Trainer FDS (1x)	R0															
	Station Masterfile	R0															
	Equipment Check sheets	R0															
	Staged\Upgraded AES202x System	R0															
	Station software Backups	R0															
	HMI Trainer SCADA Code Review Report (1x)	R0															
	FAT Procedure (1x)	R0															
	Thin slice Records	R0															
	iFAT Records (1x)	R0															
	cFAT Records (1x)	R0															
	Anomaly Lists and Correction Records	R0															
2.17	HMI Training System -System Installation and Commissioning	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Station Masterfile	R0															
	Station Integration Procedure (1x)	R0															
	Commissioned System	R0															
	Station software Backups	R0															
	E&I Installation Works (1x)	R0															
	Electrical CoCs (1x)	R0															
	Station SAT Procedure (1x)	R0															
	SAT Records (1x)	R0															
	Anomaly Lists and Correction Records	R0															
2.18	HMI Training System -System Handover	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	System Data Pack	R0															
	Equipment, Hardware and Software Licensing	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Equipment, Hardware and Software Licensing	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	PCS Hardware/Computers	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Metering Hardware	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Network Hardware	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	PLC Hardware	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	PCS Panel Supply	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	PCS Licensing (SCADA, PLC)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Project Closeout	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
2.22	Project Closeout	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Automation System Performance Test Report	R0															
	Verified as-built documentation (15x packs)	R0															
	Complete set of development/built/test history records for software, hardware	R0															
	Software Backups	R0															
	System and Equipment Configuration Procedure and Records	R0															
	System Operating, Maintenance Procedures	R0															
	OEM Equipment Manuals	R0															
	Software Simulator and Test Objects used in the station software development tests and FATs.	R0															
	Commissioning Spares are issued to the Employer	R0															

EXECUTION PHASE 2: MULTI-STATION		Phase 2D			Phase 2E	Works Information	Comments
		Secunda ZAR	Sasolburg ZAR	Klerksdorp ZAR	TLR IRP ZAR		
NEC3 ECC Option A: Priced Contract with activity schedule							
App C2 Reference	Phase 2: Total	R0	R0	R0	R0		
	Phase 2: Project, Quality and Safety Management	R0	R0	R0	R0		
	Phase 2: PCS/CMS System Engineering	R0	R0	R0	R0		
	Phase 2: Multi-Station Execution	R0	R0	R0	R0		
	Phase 2: Equipment, Hardware and Software Licensing	R0	R0	R0	R0		
	Phase 2: Project Closeout	R0	R0	R0	R0		
	Project, Quality and Safety Management	R0	R0	R0	R0		
2.01	Project, Quality and Safety Management	R0	R0	R0	R0	Section 4.2.3.1	
	Monthly Programme (Schedule) Update						Payment to be equally apportioned across the full duration of the Phase.
	Monthly Cost Report						Payment to be equally apportioned across the full duration of the Phase.
	Monthly Cashflow Forecast						Payment to be equally apportioned across the full duration of the Phase.
	Monthly Project Risk Register Update						Payment to be equally apportioned across the full duration of the Phase.
	Monthly Progress Report						Payment to be equally apportioned across the full duration of the Phase.
	Site Safety Files						
	Procurement Tracking Register (Update)						Payment to be equally apportioned across the full duration of the Phase.
	Materials Management Register (Update)						Payment to be equally apportioned across the full duration of the Phase.
	Monthly Progress of QCP's						Payment to be equally apportioned across the full duration of the Phase.
	Monthly Quality Management Report						Payment to be equally apportioned across the full duration of the Phase.
	Monthly Document and Drawing Register Update						Payment to be equally apportioned across the full duration of the Phase.
	Management and supervision of E&I Installation Works						Payment to be equally apportioned across the full duration of the E&I Installation Works.
	PCS/CMS System Engineering	R0	R0	R0	R0		
2.02	PCS/CMS System Engineering (Inland Stations)	R0	R0	R0	R0	Section 4.2.3.2	
	SCADA Architecture Designs (14x)						There are 13 sites, but ALR will have two separate control systems, installations, commissioning and handovers (14x systems + MCC + SCC)
	PLC Architecture Designs (14x)						There are 13 sites, but ALR will have two separate control systems, installations, commissioning and handovers (14x systems + MCC + SCC)
	Network Topology Designs (14x)						There are 13 sites, but ALR will have two separate control systems, installations, commissioning and handovers (14x systems + MCC + SCC)
	PCS BOQs (14x)						There are 13 sites, but ALR will have two separate control systems, installations, commissioning and handovers (14x systems + MCC + SCC)
	Field Equipment BOQs (14x)						There are 13 sites, but ALR will have two separate control systems, installations, commissioning and handovers (14x systems + MCC + SCC)
	Station PLC FDS (14x)						There are 13 sites, but ALR will have two separate control systems, installations, commissioning and handovers (14x systems + MCC + SCC)
	OASys 2018 SCADA FDS						
	AES202x SCADA FDS						
	Station Software License Register (14x)						There are 13 sites, but ALR will have two separate control systems, installations, commissioning and handovers (14x systems + MCC + SCC)
	Station Configuration Sheets (14 sets)						There are 13 sites, but ALR will have two separate control systems, installations, commissioning and handovers (14x systems + MCC + SCC)
	Commissioning and Maintenance Spares Lists						
	Station PCS/CMS EDS (13x) (Redline)						
	Range, Alarm and Trip Schedules (14x) (Redline)						There are 13 sites, but ALR will have two separate control systems, installations, commissioning and handovers (14x systems + MCC + SCC)
	IO Lists (14x) (Redline)						There are 13 sites, but ALR will have two separate control systems, installations, commissioning and handovers (14x systems + MCC + SCC)
2.03	PCS/CMS System Engineering (MCC)	R0	R0	R0	R0	Section 4.2.3.3	
	SCADA Architecture Designs (1 set)						
	Network Topology Designs (1 set)						
	PCS BOQs (1x)						
	OASys 2018 SCADA FDS						
	AES202x SCADA FDS						
	MCC Software License Register (1 set)						
	MCC Configuration Sheets (1 sets)						
	Videowall Patching and Topology (1x) (update)						
	Firewall Configuration and specification (update)						
	Commissioning and Maintenance Spares Lists (1x)						
	Diagnostics Systems FDS						
2.04	PCS/CMS System Engineering (SCC)	R0	R0	R0	R0	Section 4.2.3.4	
	SCADA Architecture Designs (1 set)						

EXECUTION PHASE 2: MULTI-STATION		Phase 2D			Phase 2E	Works Information	Comments
		Secunda ZAR	Sasolburg ZAR	Klerksdorp ZAR	TLR IRP ZAR		
NEC3 ECC Option A: Priced Contract with activity schedule							
	Network Topology Designs (1 set)						
	PCS BOQs (1x)						
	Desk Patching Topology						
	SCC Software License Register(1 set)						
	SCC Configuration Sheets (1 set)						
2.05	PCS/CMS System Engineering (HMI Trainer)	R0	R0	R0	R0	Section 4.2.3.5	
	SCADA\PLC (soft) Architecture Designs						
	Network Topology Designs						
	PCS BOQs (1x)						
	AES HMI Trainer FDS						
	HMI Trainer Configuration Sheets						
	HMI Trainer OASyS\AES2x Changeover Procedure						
2.06	Procurement – General (Inland Stations/ MCC/ SCC/ Transnet Academy)	R0	R0	R0	R0	Section 4.2.3.6	
	Material Management Schedule						
	Procurement Tracking Register						
	DDS updates (with Vendor data)						
2.07	Procurement, Fabrication, Testing, Delivery of Panels (Inland Stations/ MCC/SCC)	R0	R0	R0	R0	Section 4.2.3.7	
	Design Documentation (update/redline)						
	Hardware Panel FAT Procedure						
	Hardware and Panel iFATs Record						
	Hardware and Panel cFATs Record						
	Anomaly Lists and Correction Records						
2.08	Avtur/MCC PCS/CMS Software Design, Development, Testing, and Integration Testing	R0	R0	R0	R0	Section 4.2.3.8	
	OASyS PLC FDS (3x)						
	OASyS SCADA FDS (1x) (update)						
	All affected PCS system documentation (1 set)						
	Station Masterfile						
	Flow Computer Configuration Records						
	Equipment Check sheets						
	Station MODBUS Map (3x)						
	Staged OASyS 2018 System						
	Avtur Station software Backups						
	Station IO List (redline)						
	Station EDS (redline)						
	Station RAT (redline)						
	Alarm Database (redline)						
	Station PLC Code Review Report (3x)						
	Station SCADA Code Review Report (3x)						
	SCADA HMI Graphics Report incl. Line wide graphics (3x)						
	FAT Procedure (3x)						
	Thin slice Records						
	iFAT Records (3x)						
	cFAT Records (3x)						
	Anomaly Lists and Correction Records						
2.09	Inland Station/MCC PCS/CMS Software Design, Development, Testing, and Integration Testing	R0	R0	R0	R0	Section 4.2.3.8	
	AES202x PLC FDS (11x)						
	AES202x SCADA FDS (1x)						
	All affected PCS system documentation (1 set)						
	Station Masterfile						
	Flow Computer Configuration Records						
	Equipment Check sheets						
	Station MODBUS Map (11x)						
	Staged AES202x System						
	Station software Backups						
	Station IO List (redline)						
	Station EDS (redline)						
	Station RAT (redline)						
	Alarm Database (redline)						
	Station PLC Code Review Report (11x)						
	Station SCADA Code Review Report (11x)						

EXECUTION PHASE 2: MULTI-STATION NEC3 ECC Option A: Priced Contract with activity schedule			Phase 2D		Phase 2E	Works Information	Comments
		Secunda ZAR	Sasolburg ZAR	Klerksdorp ZAR	TLR IRP ZAR		
	SCADA HMI Graphics Report incl. Line wide graphics (11x)						No Lineside graphic for Tarlton Refractionator
	FAT Procedure (11x)						
	Thin slice Records						
	iFAT Records (11x)						
	cFAT Records (11x)						
	Anomaly Lists and Correction Records						
	Multi-Station Execution	R0	R0	R0	R0		
2.10	Inland Station Installation, Changeover and Commissioning	R0	R0	R0	R0	Section 4.2.3.9	
	Station Masterfile						
	Station Integration Procedure (14x)						There are 13 sites, but ALR will have two separate control systems, installations, commissioning and handovers (14x systems + MCC + SCC)
	Station System Change-over plan (1x)						There are 13 sites, but ALR will have two separate control systems, installations, commissioning and handovers (14x systems + MCC + SCC)
	Station Commissioning Plan (14x)						There are 13 sites, but ALR will have two separate control systems, installations, commissioning and handovers (14x systems + MCC + SCC)
	Shutdown Readiness SOP (14x)						There are 13 sites, but ALR will have two separate control systems, installations, commissioning and handovers (14x systems + MCC + SCC)
	Commissioned System						
	Station software Backups						
	E&I Installation Works (14x)						E&I Installation works to be priced after contract award.
	Electrical CoCs (14x)						E&I Installation works to be priced after contract award.
	Station IO List (redline)						
	Station EDS (redline)						
	Station RAT (redline)						
	Alarm Database (redline)						
	Station SAT Procedure (14x)						There are 13 sites, but ALR will have two separate control systems, installations, commissioning and handovers (14x systems + MCC + SCC)
	SAT Records (14x)						There are 13 sites, but ALR will have two separate control systems, installations, commissioning and handovers (14x systems + MCC + SCC)
	Anomaly Lists and Correction Records						
	PCS/CMS System Performance SAT Records (14x)						There are 13 sites, but ALR will have two separate control systems, installations, commissioning and handovers (14x systems + MCC + SCC)
2.11	MCC, SCC Installation, Changeover and Commissioning	R0	R0	R0	R0	Section 4.2.3.9	
	Station Masterfile						
	MCC Integration Procedure (1x)						
	MCC System Changeover Plan (1x)						
	Commissioned System						
	PLMS System						Cost allocated in PLMS Activity Schedule
	MCC software Backups						
	Diagnostic Tool (Acronis, MS Audit, Version Tool) Configuration						
	E&I Installation Works (2x)						E&I Installation works to be priced after contract award.
	Electrical CoCs (2x)						E&I Installation works to be priced after contract award.
	MCC, SCC SAT Procedure (1x)						
	SAT Records (1x)						
	PLMS SAT Procedure (1x) (per segment)						Cost allocated in PLMS Activity Schedule
	PLMS SAT Records (1x) (per segment)						Cost allocated in PLMS Activity Schedule
	Anomaly Lists and Correction Records						
	PCS/CMS System Performance SAT Records (1x)						
2.12	Inland Station/MCC/SCC Handover	R0	R0	R0	R0	Section 4.2.3.10	
	System Data Pack (14x + 2x)						There are 13 sites, but ALR will have two separate control systems, installations, commissioning and handovers (14x systems + MCC + SCC)
2.13	Operational Readiness: Operations Training	R0	R0	R0	R0	Section 4.6.1	
	Operating and Maintenance Manuals (3 sets)						
	Equipment Manuals (3 sets)						
	Operations Train-the Trainer Training Course Material (2 sets)						
	Update of TPL existing system specific procedures and/or work instructions						
	Operations manuals for each system						
	Operations train-the-trainer training course presentation media.						
	Provision of 1x Trainer Course on PCS/CMS/PLMS: 2 persons, 3 days.						
	Provision of PLMS Training Course for 3 x Senior Coordinating Officers: 1 day each.						

EXECUTION PHASE 2: MULTI-STATION NEC3 ECC Option A: Priced Contract with activity schedule		Phase 2D			Phase 2E	Works Information	Comments
		Secunda ZAR	Sasolburg ZAR	Klerksdorp ZAR	TLR IRP ZAR		
2.14	Operational Readiness: Technical Training	R0	R0	R0	R0	Section 4.6.2	
	Technical and Maintenance Manuals (3 set)						
	Equipment Manuals (3 set)						
	AVEVA Enterprise SCADA Intermediate Course Workshop						
	AVEVA Enterprise SCADA Advanced Course Workshop						
	Schneider EcoStruxure Control Expert Programming course (10 people)						
	PCS Project-tailored technical training courses						
2.15	Maintenance and Support	R0	R0	R0	R0	Section 4.6.3	
	Maintenance & Support Agreement (SLA)						
2.16	HMI Training System - Staging and Development	R0	R0	R0	R0	Section 4.2.3.11	
	AES202x HMI Trainer FDS (1x)						
	Station Masterfile						
	Equipment Check sheets						
	Staged\Upgraded AES202x System						
	Station software Backups						
	HMI Trainer SCADA Code Review Report (1x)						
	FAT Procedure (1x)						
	Thin slice Records						
	iFAT Records (1x)						
	cFAT Records (1x)						
	Anomaly Lists and Correction Records						
2.17	HMI Training System -System Installation and Commissioning	R0	R0	R0	R0	Section 4.2.3.11	
	Station Masterfile						
	Station Integration Procedure (1x)						
	Commissioned System						
	Station software Backups						
	E&I Installation Works (1x)						E&I Installation works to be priced after contract award.
	Electrical CoCs (1x)						E&I Installation works to be priced after contract award.
	Station SAT Procedure (1x)						
	SAT Records (1x)						
	Anomaly Lists and Correction Records						
2.18	HMI Training System -System Handover	R0	R0	R0	R0	Section 4.2.3.11	
	System Data Pack						
	Equipment, Hardware and Software Licensing	R0	R0	R0	R0		
	Equipment, Hardware and Software Licensing	R0	R0	R0	R0		
	PCS Hardware/Computers	R0	R0	R0	R0	App F1: Server\Client Equipment	Details in Supply BOQ
	Metering Hardware	R0	R0	R0	R0	App F2: Metering Equipment	Details in Supply BOQ
	Network Hardware	R0	R0	R0	R0	App F3: Networking Equipment	Details in Supply BOQ
	PLC Hardware	R0	R0	R0	R0	App F4: PLC Hardware	Details in Supply BOQ
	PCS Panel Supply	R0	R0	R0	R0	App F5: Panel Supply	Details in Supply BOQ
	PCS Licensing (SCADA, PLC)	R0	R0	R0	R0	Section 4.6.4	Details in Supply BOQ
	Project Closeout	R0	R0	R0	R0		
2.22	Project Closeout	R0	R0	R0	R0	Section 4.5.3	
	Automation System Performance Test Report						
	Verified as-built documentation (15x packs)						
	Complete set of development/built/test history records for software, hardware						
	Software Backups						
	System and Equipment Configuration Procedure and Records						
	System Operating, Maintenance Procedures						
	OEM Equipment Manuals						
	Software Simulator and Test Objects used in the station software development tests and FATs.						
	Commissioning Spares are issued to the Employer						

EXECUTION PHASE 2: PLMS		Total Cost ZAR	Portion of Cost ZAR	Portion of Cost USD	Phase 2A ZAR	Phase 2B ZAR	Phase 2C ZAR	Phase 2D ZAR	Works Information Reference	Comments
NEC3 ECC Option A: Priced Contract with activity schedule										
App C2 Reference	Phase 2 PLMS: Total	R0	R0	\$0	R0	R0	R0	R0		
	Phase 2: Project, Quality and Safety Management	R0			R0	R0	R0	R0		
	Phase 2: PLMS Software Development	R0			R0	R0	R0	R0		
	Phase 2: Installation, Commissioning and Tuning	R0			R0	R0	R0	R0		
	Phase 2: PLMS Handover	R0			R0	R0	R0	R0		
	Project, Quality and Safety Management	R0	R0	\$0	R0	R0	R0	R0		
2.01	Project Management	R0	R0	\$0	R0	R0	R0	R0	Section 4.2.3.1	
	Monthly Programme (Schedule) Update	R0								Payment to be equally apportioned across the full duration of the Phase.
	Monthly Cost Report	R0								Payment to be equally apportioned across the full duration of the Phase.
	Monthly Cashflow Forecast	R0								Payment to be equally apportioned across the full duration of the Phase.
	Monthly Project Risk Register Update	R0								Payment to be equally apportioned across the full duration of the Phase.
	Monthly Progress Report	R0								Payment to be equally apportioned across the full duration of the Phase.
	Site Safety Files	R0								Included in Phase 2 Activity Schedule
	Procurement Tracking Register (Update)	R0								Payment to be equally apportioned across the full duration of the Phase.
	Materials Management Register (Update)	R0								Payment to be equally apportioned across the full duration of the Phase.
	Monthly Progress of QCP's	R0								Payment to be equally apportioned across the full duration of the Phase.
	Monthly Quality Management Report	R0								Payment to be equally apportioned across the full duration of the Phase.
	Monthly Document and Drawing Register Update	R0								Payment to be equally apportioned across the full duration of the Phase.
	Management and supervision of E&I Installation Works	R0								Included in Phase 2 Activity Schedule
	PLMS Software Development	R0	R0	\$0	R0	R0	R0	R0		
2.19	PLMS Staging	R0	R0	\$0	R0	R0	R0	R0	Section 4.3.3.3.1	
	SimSuite LDS Integration Procedure (1x)	R0								
	PIM PLMS Integration Procedure (1x)	R0								
	Equipment Check sheets	R0								
	Staged OASyS 2018 SimSuite System	R0								
	Staged AES202x PIM System	R0								
	Anomaly Lists and Correction Records	R0								
	PLMS Hardware/Computers	R0								Details in Supply BOQ
	PLMS Licensing	R0								Details in Supply BOQ
2.20	PLMS Development / PLMS Validation	R0	R0	\$0	R0	R0	R0	R0	Section 4.3.3.3.2\3	
	AES202x PLMS FDS (1x)	R0								
	OASyS LDS FDS (1x)	R0								
	PLMS Masterfile	R0								
	AES202x PLMS System	R0								
	OASyS LDS System	R0								
	PLMS Code Review Report (1x)	R0								
	SCADA HMI Graphics Report (multiple)	R0								
	FAT Procedure (multiple)	R0								
	Thin slice Records	R0								
	iFAT Records (multiple)	R0								
	cFAT Records (multiple)	R0								
	Anomaly Lists and Correction Records	R0								
	Installation, Commissioning and Tuning	R0	R0	\$0	R0	R0	R0	R0		
2.21	PLMS Installation, Commissioning, Tuning	R0	R0	\$0	R0	R0	R0	R0	Section 4.3.3.4	
	PLMS Masterfile	R0								
	PLMS\LDS Integration Procedure (2x)	R0								
	Instrument Assessment (1 per deployment)	R0								
	Tuning Report (1 per deployment)	R0								
	Commissioned PLMS System	R0								
	MCC PLMS SAT Procedure (1 per deployment)	R0								
	SAT Records (1 per deployment)	R0								
	Anomaly Lists and Correction Records	R0								
	PLMS Handover	R0	R0	\$0	R0	R0	R0	R0		
2.11	PLMS Handover	R0	R0	\$0	R0	R0	R0	R0	Section 4.3.3.4	
	Masterfile	R0								

EXECUTION PHASE 2: PLMS		Total Cost ZAR	Portion of Cost ZAR	Portion of Cost USD	Phase 2A ZAR	Phase 2B ZAR	Phase 2C ZAR	Phase 2D ZAR	Works Information Reference	Comments
NEC3 ECC Option A: Priced Contract with activity schedule										
App C2 Reference	Phase 2 PLMS: Total	R0	R0	\$0	R0	R0	R0	R0		
	Phase 2: Project, Quality and Safety Management	R0			R0	R0	R0	R0		
	Phase 2: PLMS Software Development	R0			R0	R0	R0	R0		
	Phase 2: Installation, Commissioning and Tuning	R0			R0	R0	R0	R0		
	PLMS System	R0								
	Software Backups	R0								
	PLMS SAT Procedure (1x) (per segment)	R0								
	PLMS SAT Records (1x) (per segment)	R0								
	Anomaly Lists and Correction Records	R0								

EXECUTION PHASE 1 & 2		Unit Rate		Quantities																			
SUPPLY BILL OF QUANTITIES		Units	Cost ZAR	TOTAL QTY	PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP	PLMS
	Total																						
	PCS Hardware/Computers																						
	Metering Hardware																						
	Network Hardware																						
	PLC Hardware																						
	PCS Panel Supply																						
	PCS Licensing (SCADA, PLC)																						
1	PCS Hardware/Computers				PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP	PLMS
1.1	SCADA Hardware																						
1.1.1	Server (MCC)	ea		7	2	3																	2
1.1.2	Server (Metering Station)	ea		21				1	2			2	2	2	2	2	2		2	2	2		
1.1.3	Server (Non-Metering Station)	ea		5						1	1							1				2	
1.1.4	Domain Controller	ea		3	1	1	1																
1.1.5	Operator Workstations	ea		38	4	5	2	2	2	1	1	2	2	2	2	2	2	1	2	2	2	2	
1.1.6	SAN Storage - MCC/DSS	ea		1		1																	
1.1.7	SAN Storage - Stations	ea		13	1				1			1	1	1	1	1	1	1	1	1	1	1	
1.1.8	Monitors - 27" QHD	ea		23	12		3		4	2	2												
1.1.9	Monitors - 27" 4K	ea		89		13	3	9				6	6	8	6	6	6	2	6	6	6	6	
1.1.10	KVM Console (1U)	ea		2										1	1								
1.1.11	Printers (LaserJet M454DN or equivalent.)	ea		15	1		1		1	1	1	1	1	1		1	1	1	1	1	1	1	
1.1.12	Active Optical Cables (Rose Electronics)	ea		91		14	0	6	6	3	2	6	6	6	6	6	6	3	6	6	6	3	
1.1.13	Video Splitters (Rose Electronics)	ea		5		5																	
1.1.14	USB Extenders (Rose Electronics)	ea		52		14		3	4	1	1	2	2	2	2	2	2	1	6	2	2	6	
1.1.15	VGA Extenders (Rose Electronics)	ea		6		6																	
1.1.16	Audio Amplifier 19"	ea		14					1	1	1	1	1	1	1	1	1	1	1	1	1	1	
1.1.17	Alarm Horn (Outdoor)	ea		14					1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2	Metering Hardware				PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP	PLMS
2.1	Emerson S600+ Flow Computer Hardware																						
2.1.1	Floboss S600+ Complete Stream (New) (P152+P144 x 2 + Fabricated metal case+ Removable front panel)	ea		13	8				2			3											
2.1.2	Floboss S600+ Complete Prover (New) (P152+P144 x 2 +P154+ Fabricated metal case+ Removable front panel)	ea		5	2				2			1											
2.1.3	Floboss S600+ CPU Stream (New) & Faceplate (P152+ Removable front panel)	ea		24											7	7				6	4		
2.1.4	Floboss S600+ CPU Prover (New) & Faceplate (P152+ Removable front panel)	ea		5											1	1				2	1		
2.1.5	Floboss S600+ CPU Stream (Upgraded) (Update P152 firmware)	ea		24										4					6				
2.1.6	Floboss S600+ CPU Prover (Update P152 firmware)	ea		4									1	1			1		1				
3	Network Hardware				PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP	PLMS
3.1	Network Hardware																						
3.1.1	Ethernet Switches (Cisco C9200-24T-4G-E or similar)	ea		32	2	2	2		2	2	2	2	2	2		2	2	2	2	2	2	2	
3.1.2	SFP Transceiver Modules (Cisco GLC-TE or similar)	ea		32	2	2	2		2	2	2	2	2	2		2	2	2	2	2	2	2	
3.1.3	Ethernet Switches (Cisco IE3100 12port or similar)	ea		20					2			2	2	2	2	2	2		2	2	2		
3.1.4	Firewalls (Foritgate NGFW HA)	ea		1			1																
3.1.5	Schneider Managed Switch - MCSESM063F2CU0 - Multimode	ea		51						2			2	6	18	3	2		3	9	6		
3.1.6	Schneider Managed Switch - MCSESM063F2CS0 - Single mode	ea		3											2			1					
4	PLC Hardware				PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP	PLMS
4.1	PLC Hardware - Power Supply																						
4.1.1	BMXCPS3500: High power AC 110/220 VAC power supply (IO)	ea		153	6				12	5	6	7	11	18	38		12			24	10	4	
4.1.2	BMXCPS3500H: High power AC 110/220 VAC power supply (Ruggedised) (IO)	ea		50												16		8	26				
4.1.3	ABL8RPM24200 AC 110/220 VAC power supply (Field) 20A	ea		167	6				14	4	6	9	14	9	39		15			30	16	5	
4.1.4	ABL8RED24400 Redundant Power Supply Module	ea		42					3	1	2	3	3	4	9		3			7	5	2	
4.1.5	ABL8RPM24200H AC 110/220 VAC power supply (Field) 20A (Ruggedised)	ea		53	6											17		5	25				
4.1.6	ABL8RED24400H Redundant Power Supply Module (Ruggedised)	ea		8												3		2	3				
4.2	PLC Hardware - PLC CPU																						
4.2.1	BMEXBP0800: PLC 8 slots Ethernet backplane	ea		0																			

EXECUTION PHASE 1 & 2		Unit Rate		Quantities																			
SUPPLY BILL OF QUANTITIES		Units	Cost ZAR	TOTAL QTY	PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP	PLMS
	Total																						
	PCS Hardware/Computers																						
	Metering Hardware																						
	Network Hardware																						
	PLC Hardware																						
	PCS Panel Supply																						
	PCS Licensing (SCADA, PLC)																						
4.2.2	BMEXBP0800H: PLC 8 slots Ethernet backplane (Ruggedised)	ea		0																			
4.2.3	BMEXBP0400: PLC 4 slots Ethernet backplane	ea		34	4				4	2	2	2	2	4	4		2			4	2	2	
4.2.4	BMEXBP0400H: PLC 4 slots Ethernet backplane (Ruggedised)	ea		8												2		2	4				
4.2.5	BMXXEM010: 5 PLC Rack protective covers	ea		251					20	9	12	13	12	20	23	16	11	9	20	29	10	47	
4.2.6	BMEH58x0x0: M580 CPU redundant family with remote and distributed I/O	ea		40	4				4	2	2	2	2	4	4	2	2	2	4	4	2		
4.2.7	BMXRMS004GPF: Memory card SD flash 4 Go for M580 CPU	ea		42	4				4	2	2	2	2	4	4	2	2	2	4	4	2	2	
4.2.8	490NAC0100: M580 Redundant link RJ45 SFP	ea		0																			
4.2.9	BMENOC0321: M580 Ethernet module with IP forwarding and with 3 Ports	ea		34	4				4	2	2	2	2	4	4		2			4	2	2	
4.2.10	BMENOC0321C: M580 Ethernet module with IP forwarding and with 3 Ports (Ruggedised – Conformal Coating)	ea		8												2		2	4				
4.2.11	BMXNRP0201: Ethernet RIO optical single mode repeater	ea		12											10			2					
4.2.12	BMXNRP0201C: Ethernet RIO optical single mode repeater (Ruggedised - Conformal Coating)			0																			
4.3	PLC Hardware - PLC Remote IO																						
4.3.1	BMEXBP0800: PLC 8 slots Ethernet backplane	ea		93					4	1	2	5	9	14	19		9			14	7	9	
4.3.2	BMEXBP0800H: PLC 8 slots Ethernet backplane (Ruggedised)	ea		27												10		5	12				
4.3.3	BMEXBP0400: PLC 4 slots Ethernet backplane	ea		35	2				4	4	2				15		1			6	1		
4.3.4	BMEXBP0400H: PLC 4 slots Ethernet backplane (Ruggedised)	ea		15												4		1	10				
4.3.5	BMXXEM010: 5 PLC Rack protective covers (incl Above 4.2.5)	ea		0																			
4.3.6	BMECRA31210: X80 Performance Ethernet Drop adapter with Ethernet backplane	ea		126	2				8	3	4	5	9	14	34		10			20	8	9	
4.3.7	BMECRA31210C: X80 Performance Ethernet Drop adapter with Ethernet backplane (Ruggedised – Conformal Coating)	ea		42												14		6	22				
4.3.8	BMXNRP0201: Ethernet RIO optical single mode repeater	ea		0																			
4.3.9	BMXNRP0201C: Ethernet RIO optical single mode repeater (Ruggedised - Conformal Coating)			0																			
4.3.10	BMXDDI3202K: 32 Digital 24 VDC positive logic input channels module	ea		190					10	4	3	7	21	38	39		25			23	12	8	
4.3.11	BMXDDI3202KH: 32 Digital 24 VDC positive logic input channels module (Ruggedised)			60												22		11	27				
4.3.12	BMXFCW501 (32 Ch DDI): 5m pre-equipped cable with 1 x 40 way connector	ea		250					10	4	3	7	21	38	39	22	25	11	27	23	12	8	
4.3.13	BMXDDI1602: 16 Digital 24 VDC positive logic input channels module	ea		70	2				2	1	2	3	3	6	24		2			14	11		
4.3.14	BMXDDI1602H: 16 Digital 24 VDC positive logic input channels module (Ruggedised)	ea		30												13		1	16				
4.3.15	BMXFTW501 (16 Ch DDI): 5m pre-equipped cable with 1 x 20 way spring type connector	ea		100	2				2	1	2	3	3	6	24	13	2	1	16	14	11		
4.3.16	BMXDDO3202K: 32 Digital 24 VDC positive logic static output channels module	ea		92					4	1	0		10	17	20		12			15	10	3	
4.3.17	BMXDDO3202KC: 32 Digital 24 VDC positive logic static output channels module (Ruggedised - Conformal Coating)			27												10		7	10				
4.3.18	BMXFCW501 (32 Ch DDO): 5m pre-equipped cable with 1 x 40 way connector	ea		119					4	1	0		10	17	20	10	12	7	10	15	10	3	
4.3.19	BMXDDO1602: 16 Digital 24 VDC positive logic static output channels module	ea		62	2				4	2	4	10	2	4	18		2			8	6		
4.3.20	BMXDDO1602H: 16 Digital 24 VDC positive logic static output channels module (Ruggedised)	ea		19												6		1	12				
4.3.21	BMXFTW501 (16 Ch DDO): 5m pre-equipped cable with 1 x 20 way spring type connector	ea		81	2				4	2	4	10	2	4	18	6	2	1	12	8	6		
4.3.22	BMXAMI0810: 8 Analog voltage/current input isolated high speed channels module	ea		175	2				11	4	7	6	14	19	50		15			31	7	9	
4.3.23	BMXAMI0810H: 8 Analog voltage/current input isolated high speed channels module (Ruggedised)	ea		60												16		8	36				
4.3.24	BMXFTW308S (8 Ch AI): 5m pre-equipped cable with 28 way terminal block connector	ea		235	2				11	4	7	6	14	19	50	16	15	8	36	31	7	9	
4.3.25	BMXAMO0410: 4 Analog voltage/current output isolated channels module	ea		27	2				2	1	1	1	3	2	5		2			4	1	3	
4.3.26	BMXAMO0410H: 4 Analog voltage/current output isolated channels module (Ruggedised)	ea		9												4		3	2				
4.3.27	BMXFTW501S (4 Ch AO): 5m pre-equipped cable with 20 way terminal block connector	ea		36	2				2	1	1	1	3	2	5	4	2	3	2	4	1	3	
4.3.28	BMXEHC0800: High Speed Counter 8 Channels with 10kHz frequency module	ea		26	2						1	1	4	3	7		3			4	1		
4.3.29	BMXEHC0800H: High Speed Counter 8 Channels with 10kHz frequency module (Ruggedised)	ea		8												1		4	3				
4.3.30	BMXFTW501S (8 Ch Counter): 5m pre-equipped cable with 20 way terminal block connector	ea		32							1	1	4	3	7	1	3	4	3	4	1		
4.3.31	BMXFTB2010: 20-way removable terminal block with screw clamp (16 ch, DI)	ea		2	2																		
4.4	PLC Hardware - Safety Rated																						

EXECUTION PHASE 1 & 2		Unit Rate		Quantities																			
SUPPLY BILL OF QUANTITIES		Units	Cost ZAR	TOTAL QTY	PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP	PLMS
	Total																						
	PCS Hardware/Computers																						
	Metering Hardware																						
	Network Hardware																						
	PLC Hardware																						
	PCS Panel Supply																						
	PCS Licensing (SCADA, PLC)																						
4.4.1	BMXCPS4002S: High power, redundant AC 110/220 VAC power supply	ea		7																		7	
4.4.2	BMEP582040S + BMEP58CPROS3: M580 CPU redundant family 40 with remote and distributed I/O, plus Coprocessor	ea		3	1																	2	
4.4.3	BMXSDI1602: 16 Digital Safety 24 VDC positive logic input channels module (SIL3)	ea		7	1																	6	
4.4.4	BMXFTB2010 (16 Ch DI Safe): 20 way screw clamp terminal block	ea		7	1																	6	
4.4.5	BMXSDO0802: 8 Digital Safety 24 VDC 0.5A positive logic static output channels module (SIL3)	ea		12	1																	11	
4.4.6	BMXSRA0405: 4 Isolated Digital Safety 24 VDC 5A positive logic static output channels module (SIL2)	ea		0																			
4.4.7	BMXFTB2010 (8 Ch DO Safe): 20 way screw clamp terminal block	ea		12	1																	11	
4.4.8	BMXSAI0410: 4 Analog Safety current input isolated channels module	ea		11	1																	10	
4.4.9	BMXFTB2010 (4 Ch AI Safe): 20 way screw clamp terminal block	ea		11	1																	10	
4.5	Instrument Safety Isolators/Barriers																						
4.5.1	KFD2-CRG2-Ex1.D: Trip Amplifier (SIL 1)	ea		29							1	3			10	8			3		4		
5	PCS Panel Supply				PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP	PLMS
5.1	Panel Supply																						
5.1.1	PLC Panel Supply			1					1														
5.1.2	Remote PLC Panel Supply			0																			
5.1.3	Metering Panel Supply			2					1			1											
5.1.4	Server Panel Supply			10	1				1	1	1	1				1			1	1	1	1	
5.1.5	Test Panel Supply			1	1																		
5.1.5	Electrical MV ET Panel Supply			22							1				4	3			8	6			
6	AOSYS 2018 PCS Services (SCADA, PLC)				PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP	PLMS
6.1	NOC-MCC (OASyS SCADA - Enterprise Edition)																						
6.1.1	Realtime Services – Hot	Lot		0																			
6.1.2	Realtime Services – Standby	Lot		0																			
6.1.3	Historical App Services – Hot	Lot		0																			
6.1.4	Historical App Services – Standby	Lot		0																			
6.1.5	Named Client License	Lot		1			1																
6.1.6	Engineering Station - Incl all required Services	Lot		0																			
6.1.7	OASyS Enterprise OPC Server	Lot		0																			
6.1.8	Playback Services	Lot		0																			
6.1.9	OASyS Reporting Services	Lot		0																			
6.2	NOC-DSS (OASyS SCADA - Enterprise Edition)																						
6.2.1	Pipeline Operations – Liquids – Decision Support Environment (incl Reporting)	Lot		1					1														
6.3	STATION (OASyS SCADA - Enterprise Edition)																						
6.3.1	Station OASyS – Hot	Lot		3					1	1	1												
6.3.2	Station OASyS – Standby	Lot		1					1														
6.3.3	Engineering Station - Incl all required Services	Lot		3					1	1	1												
6.3.4	Named Client License	Lot		3					1	1	1												
6.3.5	OASyS Reporting Services	Lot		3					1	1	1												
6.4	HMI TRAINER (OASyS SCADA - Enterprise Edition)																						
6.4.1	Station OASyS - Administrator	Lot		0																			
6.4.2	Engineering Station - Incl all required Services	Lot		0																			
6.4.3	Named Client License	Lot		0																			
6.4.4	Historical Database Server	Lot		0																			
6.4.5	OASyS Reporting Services	Lot		0																			
6.5	CUSTODY METERING (OASyS SCADA - Enterprise Edition)																						
6.5.1	Pipeline Operations - Liquids – Flow Computer Management (FCM)	Lot		1					1														
6.5.2	Pipeline Operations - Liquids – BTM connector to Flow Computer Management	Lot		1					1														

EXECUTION PHASE 1 & 2		Unit Rate		Quantities																			
SUPPLY BILL OF QUANTITIES		Units	Cost ZAR	TOTAL QTY	PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP	PLMS
	Total																						
	PCS Hardware/Computers																						
	Metering Hardware																						
	Network Hardware																						
	PLC Hardware																						
	PCS Panel Supply																						
	PCS Licensing (SCADA, PLC)																						
6.5.3	Pipeline Operations - Liquids – Tank Management Application	Lot		0																			
6.6	PIPELINE MONITORING																						
6.6.1	Pipeline Operations – Liquids – Leak Detection	Lot		1																			1
6.6.2	Pipeline Operations – Liquids – Batch Tracking	Lot		0																			
6.6.3	Pipeline Operations – Liquids – Theft Detection	Lot		0																			
6.6.4	Pipeline Operations – Liquids – Pig Tracking	Lot		0																			
6.7	PLC Licenses																						
6.7.1	Control Expert XL Entity Licence	Lot		0																			
6	AES202x PCS Services (SCADA, PLC)				PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP	PLMS
7.1	NOC-MCC (AES202x SCADA - Enterprise Edition)																						
7.1.1	Realtime Services – Hot	Lot		2	1	1																	
7.1.2	Realtime Services – Standby	Lot		2	1	1																	
7.1.3	Historical App Services – Hot	Lot		2	1	1																	
7.1.4	Historical App Services – Standby	Lot		2	1	1																	
7.1.5	Named Client License	Lot		2	1	1																	
7.1.6	Engineering Station - Incl all required Services	Lot		2	1	1																	
7.1.7	AES202x Enterprise OPC Server	Lot		2	1	1																	
7.1.8	Playback Services	Lot		2	1	1																	
7.1.9	AES202x Reporting Services	Lot		2	1	1																	
7.2	NOC-DSS (AES202x SCADA - Enterprise Edition)																						
7.2.1	Pipeline Operations – Liquids – Decision Support Environment (incl Reporting)	Lot		2	1	1																	
7.3	STATION (AES202x SCADA - Enterprise Edition)																						
7.3.1	Station AES202x – Hot	Lot		11								1	1	1	1	1	1	1	1	1	1	1	
7.3.2	Station AES202x – Standby	Lot		10								1	1	1	1	1	1		1	1	1	1	
7.3.3	Engineering Station - Incl all required Services	Lot		11								1	1	1	1	1	1	1	1	1	1	1	
7.3.4	Named Client License	Lot		11								1	1	1	1	1	1	1	1	1	1	1	
7.3.5	AES202x Reporting Services	Lot		11								1	1	1	1	1	1	1	1	1	1	1	
7.4	HMI TRAINER (AES202x SCADA - Enterprise Edition)																						
7.4.1	Station AES202x - Administrator	Lot		1				1															
7.4.2	Engineering Station - Incl all required Services	Lot		1				1															
7.4.3	Named Client License	Lot		1				1															
7.4.4	Historical Database Server	Lot		1				1															
7.4.5	AES202x Reporting Services	Lot		1				1															
7.5	CUSTODY METERING (AES202x SCADA - Enterprise Edition)																						
7.5.1	Pipeline Operations - Liquids – Flow Computer Management (FCM)	Lot		9								1	1	1	1	1	1		1	1	1		
7.5.2	Pipeline Operations - Liquids – BTM connector to Flow Computer Management	Lot		9								1	1	1	1	1	1		1	1	1		
7.5.3	Pipeline Operations - Liquids – Tank Management Application	Lot		1										1									
7.6	PIPELINE MONITORING																						
7.6.1	Pipeline Operations – Liquids – Leak Detection	Lot		1																			1
7.6.2	Pipeline Operations – Liquids – Batch Tracking	Lot		1																			1
7.6.3	Pipeline Operations – Liquids – Theft Detection	Lot		1																			1
7.7.4	Pipeline Operations – Liquids – Pig Tracking	Lot		1																			1
7.7	PLC Licenses																						
7.7.1	Control Expert XL Entity Licence	Lot		12				1				1	1	1	1	1	1	1	1	1	1	1	
8	Additional Services (SCADA, PLC)				PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP	PLMS
8.1	OPC Bridge																						
8.1.1	OPC Bridge Software	ea		1		1																	
8.1.2	OPC Bridge Software (Upgrade)	ea		1		1																	

EXECUTION PHASE 1 & 2		Unit Rate		Quantities																			
SUPPLY BILL OF QUANTITIES		Units	Cost ZAR	TOTAL QTY	PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP	PLMS
	Total																						
	PCS Hardware/Computers																						
	Metering Hardware																						
	Network Hardware																						
	PLC Hardware																						
	PCS Panel Supply																						
	PCS Licensing (SCADA, PLC)																						
8.2	Diagnostic Tools																						
8.2.1	ACRONIS Backup Tool	ea		16		1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
8.2.2	Microsoft Extra ID Diagnostics Audit Tool	ea		1		1																	

EXECUTION PHASE 1 & 2		Total Cost ZAR	Portion of Cost ZAR	Portion of Cost USD	Staging System ZAR	NOC ZAR	SCC ZAR	HMI TRN ZAR	Airport ZAR	Meyerton ZAR	Alrode-AV ZAR	Rustenburg ZAR	Langlaagte ZAR	Tarlton ZAR	Alrode-MP ZAR	Witbank ZAR	Waltloo ZAR
SUPPLY BILL OF QUANTITIES																	
	Total	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	PCS Hardware/Computers	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Metering Hardware	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Network Hardware	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	PLC Hardware	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	PCS Panel Supply	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	PCS Licensing (SCADA, PLC)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
1	PCS Hardware/Computers	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
1.1	SCADA Hardware	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
1.1.1	Server (MCC)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
1.1.2	Server (Metering Station)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
1.1.3	Server (Non-Metering Station)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
1.1.4	Domain Controller	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
1.1.5	Operator Workstations	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
1.1.6	SAN Storage - MCC/DSS	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
1.1.7	SAN Storage - Stations	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
1.1.8	Monitors - 27" QHD	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
1.1.9	Monitors - 27" 4K	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
1.1.10	KVM Console (1U)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
1.1.11	Printers (LaserJet M454DN or equivalent.)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
1.1.12	Active Optical Cables (Rose Electronics)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
1.1.13	Video Splitters (Rose Electronics)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
1.1.14	USB Extenders (Rose Electronics)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
1.1.15	VGA Extenders (Rose Electronics)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
1.1.16	Audio Amplifier 19"	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
1.1.17	Alarm Horn (Outdoor)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
2	Metering Hardware	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
2.1	Emerson S600+ Flow Computer Hardware	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
2.1.1	Floboss S600+ Complete Stream (New) (P152+P144 x 2 + Fabricated metal case+ Removable front panel)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
2.1.2	Floboss S600+ Complete Prover (New) (P152+P144 x 2 +P154+ Fabricated metal case+ Removable front panel)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
2.1.3	Floboss S600+ CPU Stream (New) & Faceplate (P152+ Removable front panel)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
2.1.4	Floboss S600+ CPU Prover (New) & Faceplate (P152+ Removable front panel)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
2.1.5	Floboss S600+ CPU Stream (Upgraded) (Update P152 firmware)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
2.1.6	Floboss S600+ CPU Prover (Update P152 firmware)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
3	Network Hardware	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
3.1	Network Hardware	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
3.1.1	Ethernet Switches (Cisco C9200-24T-4G-E or similar)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
3.1.2	SFP Transceiver Modules (Cisco GLC-TE or similar)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
3.1.3	Ethernet Switches (Cisco IE3100 12port or similar)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
3.1.4	Firewalls (Fortigate NGFW HA)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
3.1.5	Schneider Managed Switch - MCSESM063F2CU0 - Multimode	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
3.1.6	Schneider Managed Switch - MCSESM063F2CS0 - Single mode	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4	PLC Hardware	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.1	PLC Hardware - Power Supply	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.1.1	BMXCPS3500: High power AC 110/220 VAC power supply (IO)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.1.2	BMXCPS3500H: High power AC 110/220 VAC power supply (Ruggedised) (IO)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.1.3	ABL8RPM24200 AC 110/220 VAC power supply (Field) 20A	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.1.4	ABL8RED24400 Redundant Power Supply Module	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.1.5	ABL8RPM24200H AC 110/220 VAC power supply (Field) 20A (Ruggedised)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.1.6	ABL8RED24400H Redundant Power Supply Module (Ruggedised)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.2	PLC Hardware - PLC CPU	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.2.1	BMEXBP0800: PLC 8 slots Ethernet backplane	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0

EXECUTION PHASE 1 & 2		Total Cost ZAR	Portion of Cost ZAR	Portion of Cost USD	Staging System ZAR	NOC ZAR	SCC ZAR	HMI TRN ZAR	Airport ZAR	Meyerton ZAR	Alrode-AV ZAR	Rustenburg ZAR	Langlaagte ZAR	Tarlton ZAR	Alrode-MP ZAR	Witbank ZAR	Waltloo ZAR
SUPPLY BILL OF QUANTITIES																	
	Total	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	PCS Hardware/Computers	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Metering Hardware	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Network Hardware	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	PLC Hardware	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	PCS Panel Supply	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	PCS Licensing (SCADA, PLC)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.2.2	BMEXBP0800H: PLC 8 slots Ethernet backplane (Ruggedised)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.2.3	BMEXBP0400: PLC 4 slots Ethernet backplane	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.2.4	BMEXBP0400H: PLC 4 slots Ethernet backplane (Ruggedised)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.2.5	BMXXEM010: 5 PLC Rack protective covers	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.2.6	BMEH58x0x0: M580 CPU redundant family with remote and distributed I/O	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.2.7	BMXRMS004GPF: Memory card SD flash 4 Go for M580 CPU	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.2.8	490NAC0100: M580 Redundant link RJ45 SFP	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.2.9	BMENOC0321: M580 Ethernet module with IP forwarding and with 3 Ports	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.2.10	BMENOC0321C: M580 Ethernet module with IP forwarding and with 3 Ports (Ruggedised – Conformal Coating)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.2.11	BMXNRP0201: Ethernet RIO optical single mode repeater	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.2.12	BMXNRP0201C: Ethernet RIO optical single mode repeater (Ruggedised - Conformal Coating)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3	PLC Hardware - PLC Remote IO	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.1	BMEXBP0800: PLC 8 slots Ethernet backplane	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.2	BMEXBP0800H: PLC 8 slots Ethernet backplane (Ruggedised)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.3	BMEXBP0400: PLC 4 slots Ethernet backplane	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.4	BMEXBP0400H: PLC 4 slots Ethernet backplane (Ruggedised)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.5	BMXXEM010: 5 PLC Rack protective covers (incl Above 4.2.5)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.6	BMECRA31210: X80 Performance Ethernet Drop adapter with Ethernet backplane	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.7	BMECRA31210C: X80 Performance Ethernet Drop adapter with Ethernet backplane (Ruggedised – Conformal Coating)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.8	BMXNRP0201: Ethernet RIO optical single mode repeater	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.9	BMXNRP0201C: Ethernet RIO optical single mode repeater (Ruggedised - Conformal Coating)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.10	BMXDDI3202K: 32 Digital 24 VDC positive logic input channels module	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.11	BMXDDI3202KH: 32 Digital 24 VDC positive logic input channels module (Ruggedised)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.12	BMXFCW501 (32 Ch DDI): 5m pre-equipped cable with 1 x 40 way connector	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.13	BMXDDI1602: 16 Digital 24 VDC positive logic input channels module	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.14	BMXDDI1602H: 16 Digital 24 VDC positive logic input channels module (Ruggedised)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.15	BMXFTW501 (16 Ch DDI): 5m pre-equipped cable with 1 x 20 way spring type connector	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.16	BMXDDO3202K: 32 Digital 24 VDC positive logic static output channels module	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.17	BMXDDO3202KC: 32 Digital 24 VDC positive logic static output channels module (Ruggedised - Conformal Coating)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.18	BMXFCW501 (32 Ch DDO): 5m pre-equipped cable with 1 x 40 way connector	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.19	BMXDDO1602: 16 Digital 24 VDC positive logic static output channels module	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.20	BMXDDO1602H: 16 Digital 24 VDC positive logic static output channels module (Ruggedised)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.21	BMXFTW501 (16 Ch DDO): 5m pre-equipped cable with 1 x 20 way spring type connector	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.22	BMXAMI0810: 8 Analog voltage/current input isolated high speed channels module	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.23	BMXAMI0810H: 8 Analog voltage/current input isolated high speed channels module (Ruggedised)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.24	BMXFTW308S (8 Ch AI): 5m pre-equipped cable with 28 way terminal block connector	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.25	BMXAMO0410: 4 Analog voltage/current output isolated channels module	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.26	BMXAMO0410H: 4 Analog voltage/current output isolated channels module (Ruggedised)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.27	BMXFTW501S (4 Ch AO): 5m pre-equipped cable with 20 way terminal block connector	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.28	BMXEHC0800: High Speed Counter 8 Channels with 10kHz frequency module	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.29	BMXEHC0800H: High Speed Counter 8 Channels with 10kHz frequency module (Ruggedised)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.30	BMXFTW501S (8 Ch Counter): 5m pre-equipped cable with 20 way terminal block connector	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.3.31	BMXFTB2010: 20-way removable terminal block with screw clamp (16 ch, DI)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.4	PLC Hardware - Safety Rated	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0

EXECUTION PHASE 1 & 2		Total Cost ZAR	Portion of Cost ZAR	Portion of Cost USD	Staging System ZAR	NOC ZAR	SCC ZAR	HMI TRN ZAR	Airport ZAR	Meyerton ZAR	Alrode-AV ZAR	Rustenburg ZAR	Langlaagte ZAR	Tarlton ZAR	Alrode-MP ZAR	Witbank ZAR	Waltloo ZAR
SUPPLY BILL OF QUANTITIES																	
	Total	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	PCS Hardware/Computers	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Metering Hardware	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Network Hardware	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	PLC Hardware	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	PCS Panel Supply	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	PCS Licensing (SCADA, PLC)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.4.1	BMXCPS4002S: High power, redundant AC 110/220 VAC power supply	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.4.2	BMEP582040S + BMEP58CPROS3: M580 CPU redundant family 40 with remote and distributed I/O, plus Coprocessor	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.4.3	BMXS DI1602: 16 Digital Safety 24 VDC positive logic input channels module (SIL3)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.4.4	BMXFTB2010 (16 Ch DI Safe): 20 way screw clamp terminal block	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.4.5	BMXS DO0802: 8 Digital Safety 24 VDC 0.5A positive logic static output channels module (SIL3)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.4.6	BMXSRA0405: 4 Isolated Digital Safety 24 VDC 5A positive logic static output channels module (SIL2)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.4.7	BMXFTB2010 (8 Ch DO Safe): 20 way screw clamp terminal block	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.4.8	BMXSAIO410: 4 Analog Safety current input isolated channels module	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.4.9	BMXFTB2010 (4 Ch AI Safe): 20 way screw clamp terminal block	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.5	Instrument Safety Isolators/Barriers	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
4.5.1	KFD2-CRG2-Ex1.D: Trip Amplifier (SIL 1)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
5	PCS Panel Supply	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
5.1	Panel Supply	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
5.1.1	PLC Panel Supply	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
5.1.2	Remote PLC Panel Supply	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
5.1.3	Metering Panel Supply	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
5.1.4	Server Panel Supply	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
5.1.5	Test Panel Supply	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
5.1.5	Electrical MV ET Panel Supply	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6	AOSYS 2018 PCS Services (SCADA, PLC)	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.1	NOC-MCC (OASyS SCADA - Enterprise Edition)	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.1.1	Realtime Services – Hot	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.1.2	Realtime Services – Standby	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.1.3	Historical App Services – Hot	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.1.4	Historical App Services – Standby	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.1.5	Named Client License	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.1.6	Engineering Station - Incl all required Services	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.1.7	OASyS Enterprise OPC Server	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.1.8	Playback Services	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.1.9	OASyS Reporting Services	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.2	NOC-DSS (OASyS SCADA - Enterprise Edition)	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.2.1	Pipeline Operations – Liquids – Decision Support Environment (incl Reporting)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.3	STATION (OASyS SCADA - Enterprise Edition)	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.3.1	Station OASyS – Hot	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.3.2	Station OASyS – Standby	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.3.3	Engineering Station - Incl all required Services	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.3.4	Named Client License	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.3.5	OASyS Reporting Services	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.4	HMI TRAINER (OASyS SCADA - Enterprise Edition)	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.4.1	Station OASyS - Administrator	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.4.2	Engineering Station - Incl all required Services	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.4.3	Named Client License	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.4.4	Historical Database Server	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.4.5	OASyS Reporting Services	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.5	CUSTODY METERING (OASyS SCADA - Enterprise Edition)	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.5.1	Pipeline Operations - Liquids – Flow Computer Management (FCM)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.5.2	Pipeline Operations - Liquids – BTM connector to Flow Computer Management	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0

EXECUTION PHASE 1 & 2		Total Cost ZAR	Portion of Cost ZAR	Portion of Cost USD	Staging System ZAR	NOC ZAR	SCC ZAR	HMI TRN ZAR	Airport ZAR	Meyerton ZAR	Alrode-AV ZAR	Rustenburg ZAR	Langlaagte ZAR	Tarlton ZAR	Alrode-MP ZAR	Witbank ZAR	Waltloo ZAR
SUPPLY BILL OF QUANTITIES																	
	Total	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	PCS Hardware/Computers	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Metering Hardware	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Network Hardware	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	PLC Hardware	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	PCS Panel Supply	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	PCS Licensing (SCADA, PLC)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.5.3	Pipeline Operations - Liquids – Tank Management Application	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.6	PIPELINE MONITORING	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.6.1	Pipeline Operations – Liquids – Leak Detection	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.6.2	Pipeline Operations – Liquids – Batch Tracking	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.6.3	Pipeline Operations – Liquids – Theft Detection	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.6.4	Pipeline Operations – Liquids – Pig Tracking	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.7	PLC Licenses	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6.7.1	Control Expert XL Entity Licence	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
6	AES202x PCS Services (SCADA, PLC)	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.1	NOC-MCC (AES202x SCADA - Enterprise Edition)	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.1.1	Realtime Services – Hot	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.1.2	Realtime Services – Standby	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.1.3	Historical App Services – Hot	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.1.4	Historical App Services – Standby	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.1.5	Named Client License	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.1.6	Engineering Station - Incl all required Services	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.1.7	AES202x Enterprise OPC Server	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.1.8	Playback Services	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.1.9	AES202x Reporting Services	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.2	NOC-DSS (AES202x SCADA - Enterprise Edition)	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.2.1	Pipeline Operations – Liquids – Decision Support Environment (incl Reporting)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.3	STATION (AES202x SCADA - Enterprise Edition)	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.3.1	Station AES202x – Hot	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.3.2	Station AES202x – Standby	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.3.3	Engineering Station - Incl all required Services	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.3.4	Named Client License	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.3.5	AES202x Reporting Services	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.4	HMI TRAINER (AES202x SCADA - Enterprise Edition)	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.4.1	Station AES202x - Administrator	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.4.2	Engineering Station - Incl all required Services	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.4.3	Named Client License	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.4.4	Historical Database Server	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.4.5	AES202x Reporting Services	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.5	CUSTODY METERING (AES202x SCADA - Enterprise Edition)	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.5.1	Pipeline Operations - Liquids – Flow Computer Management (FCM)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.5.2	Pipeline Operations - Liquids – BTM connector to Flow Computer Management	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.5.3	Pipeline Operations - Liquids – Tank Management Application	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.6	PIPELINE MONITORING	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.6.1	Pipeline Operations – Liquids – Leak Detection	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.6.2	Pipeline Operations – Liquids – Batch Tracking	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.6.3	Pipeline Operations – Liquids – Theft Detection	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.7.4	Pipeline Operations – Liquids – Pig Tracking	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.7	PLC Licenses	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
7.7.1	Control Expert XL Entity Licence	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
8	Additional Services (SCADA, PLC)	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
8.1	OPC Bridge	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
8.1.1	OPC Bridge Software	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
8.1.2	OPC Bridge Software (Upgrade)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0

EXECUTION PHASE 1 & 2		Total Cost ZAR	Portion of Cost ZAR	Portion of Cost USD	Staging System ZAR	NOC ZAR	SCC ZAR	HMI TRN ZAR	Airport ZAR	Meyerton ZAR	Alrode-AV ZAR	Rustenburg ZAR	Langlaagte ZAR	Tarlton ZAR	Alrode-MP ZAR	Witbank ZAR	Waltloo ZAR
SUPPLY BILL OF QUANTITIES																	
	Total	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	PCS Hardware/Computers	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Metering Hardware	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	Network Hardware	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	PLC Hardware	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	PCS Panel Supply	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
	PCS Licensing (SCADA, PLC)	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
8.2	Diagnostic Tools	R0	R0	\$0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
8.2.1	ACRONIS Backup Tool	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0
8.2.2	Microsoft Extra ID Diagnostics Audit Tool	R0			R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0

EXECUTION PHASE 1 & 2		Kendal ZAR	Secunda ZAR	Sasolburg ZAR	Klerksdorp ZAR	TLR IRP ZAR	Total PLMS ZAR	Comments
SUPPLY BILL OF QUANTITIES								
	Total	R0	R0	R0	R0	R0	R0	
	PCS Hardware/Computers	R0	R0	R0	R0	R0	R0	
	Metering Hardware	R0	R0	R0	R0	R0	R0	
	Network Hardware	R0	R0	R0	R0	R0	R0	
	PLC Hardware	R0	R0	R0	R0	R0	R0	
	PCS Panel Supply	R0	R0	R0	R0	R0	R0	
	PCS Licensing (SCADA, PLC)	R0	R0	R0	R0	R0	R0	
1	PCS Hardware/Computers	R0	R0	R0	R0	R0	R0	
1.1	SCADA Hardware	R0	R0	R0	R0	R0	R0	
1.1.1	Server (MCC)	R0	R0	R0	R0	R0	R0	
1.1.2	Server (Metering Station)	R0	R0	R0	R0	R0	R0	
1.1.3	Server (Non-Metering Station)	R0	R0	R0	R0	R0	R0	
1.1.4	Domain Controller	R0	R0	R0	R0	R0	R0	
1.1.5	Operator Workstations	R0	R0	R0	R0	R0	R0	
1.1.6	SAN Storage - MCC/DSS	R0	R0	R0	R0	R0	R0	
1.1.7	SAN Storage - Stations	R0	R0	R0	R0	R0	R0	
1.1.8	Monitors - 27" QHD	R0	R0	R0	R0	R0	R0	
1.1.9	Monitors - 27" 4K	R0	R0	R0	R0	R0	R0	
1.1.10	KVM Console (1U)	R0	R0	R0	R0	R0	R0	
1.1.11	Printers (LaserJet M454DN or equivalent.)	R0	R0	R0	R0	R0	R0	
1.1.12	Active Optical Cables (Rose Electronics)	R0	R0	R0	R0	R0	R0	
1.1.13	Video Splitters (Rose Electronics)	R0	R0	R0	R0	R0	R0	
1.1.14	USB Extenders (Rose Electronics)	R0	R0	R0	R0	R0	R0	
1.1.15	VGA Extenders (Rose Electronics)	R0	R0	R0	R0	R0	R0	
1.1.16	Audio Amplifier 19"	R0	R0	R0	R0	R0	R0	
1.1.17	Alarm Horn (Outdoor)	R0	R0	R0	R0	R0	R0	
2	Metering Hardware	R0	R0	R0	R0	R0	R0	
2.1	Emerson S600+ Flow Computer Hardware	R0	R0	R0	R0	R0	R0	
2.1.1	Floboss S600+ Complete Stream (New) (P152+P144 x 2 + Fabricated metal case+ Removable front panel)	R0	R0	R0	R0	R0	R0	
2.1.2	Floboss S600+ Complete Prover (New) (P152+P144 x 2 +P154+ Fabricated metal case+ Removable front panel)	R0	R0	R0	R0	R0	R0	
2.1.3	Floboss S600+ CPU Stream (New) & Faceplate (P152+ Removable front panel)	R0	R0	R0	R0	R0	R0	
2.1.4	Floboss S600+ CPU Prover (New) & Faceplate (P152+ Removable front panel)	R0	R0	R0	R0	R0	R0	
2.1.5	Floboss S600+ CPU Stream (Upgraded) (Update P152 firmware)	R0	R0	R0	R0	R0	R0	
2.1.6	Floboss S600+ CPU Prover (Update P152 firmware)	R0	R0	R0	R0	R0	R0	
3	Network Hardware	R0	R0	R0	R0	R0	R0	
3.1	Network Hardware	R0	R0	R0	R0	R0	R0	
3.1.1	Ethernet Switches (Cisco C9200-24T-4G-E or similar)	R0	R0	R0	R0	R0	R0	
3.1.2	SFP Transceiver Modules (Cisco GLC-TE or similar)	R0	R0	R0	R0	R0	R0	
3.1.3	Ethernet Switches (Cisco IE3100 12port or similar)	R0	R0	R0	R0	R0	R0	
3.1.4	Firewalls (Foritgate NGFW HA)	R0	R0	R0	R0	R0	R0	
3.1.5	Schneider Managed Switch - MCSESM063F2CU0 - Multimode	R0	R0	R0	R0	R0	R0	
3.1.6	Schneider Managed Switch - MCSESM063F2CS0 - Single mode	R0	R0	R0	R0	R0	R0	
4	PLC Hardware	R0	R0	R0	R0	R0	R0	
4.1	PLC Hardware - Power Supply	R0	R0	R0	R0	R0	R0	
4.1.1	BMXCPS3500: High power AC 110/220 VAC power supply (IO)	R0	R0	R0	R0	R0	R0	
4.1.2	BMXCPS3500H: High power AC 110/220 VAC power supply (Ruggedised) (IO)	R0	R0	R0	R0	R0	R0	
4.1.3	ABL8RPM24200 AC 110/220 VAC power supply (Field) 20A	R0	R0	R0	R0	R0	R0	
4.1.4	ABL8RED24400 Redundant Power Supply Module	R0	R0	R0	R0	R0	R0	
4.1.5	ABL8RPM24200H AC 110/220 VAC power supply (Field) 20A (Ruggedised)	R0	R0	R0	R0	R0	R0	
4.1.6	ABL8RED24400H Redundant Power Supply Module (Ruggedised)	R0	R0	R0	R0	R0	R0	
4.2	PLC Hardware - PLC CPU	R0	R0	R0	R0	R0	R0	
4.2.1	BMEXBP0800: PLC 8 slots Ethernet backplane	R0	R0	R0	R0	R0	R0	

EXECUTION PHASE 1 & 2		Kendal ZAR	Secunda ZAR	Sasolburg ZAR	Klerksdorp ZAR	TLR IRP ZAR	Total PLMS ZAR	Comments
SUPPLY BILL OF QUANTITIES								
	Total	R0	R0	R0	R0	R0	R0	
	PCS Hardware/Computers	R0	R0	R0	R0	R0	R0	
	Metering Hardware	R0	R0	R0	R0	R0	R0	
	Network Hardware	R0	R0	R0	R0	R0	R0	
	PLC Hardware	R0	R0	R0	R0	R0	R0	
	PCS Panel Supply	R0	R0	R0	R0	R0	R0	
	PCS Licensing (SCADA, PLC)	R0	R0	R0	R0	R0	R0	
4.2.2	BMEXBP0800H: PLC 8 slots Ethernet backplane (Ruggedised)	R0	R0	R0	R0	R0	R0	
4.2.3	BMEXBP0400: PLC 4 slots Ethernet backplane	R0	R0	R0	R0	R0	R0	
4.2.4	BMEXBP0400H: PLC 4 slots Ethernet backplane (Ruggedised)	R0	R0	R0	R0	R0	R0	
4.2.5	BMXXEM010: 5 PLC Rack protective covers	R0	R0	R0	R0	R0	R0	
4.2.6	BMEH58x0x0: M580 CPU redundant family with remote and distributed I/O	R0	R0	R0	R0	R0	R0	
4.2.7	BMXRMS004GPF: Memory card SD flash 4 Go for M580 CPU	R0	R0	R0	R0	R0	R0	
4.2.8	490NAC0100: M580 Redundant link RJ45 SFP	R0	R0	R0	R0	R0	R0	
4.2.9	BMENOC0321: M580 Ethernet module with IP forwarding and with 3 Ports	R0	R0	R0	R0	R0	R0	
4.2.10	BMENOC0321C: M580 Ethernet module with IP forwarding and with 3 Ports (Ruggedised – Conformal Coating)	R0	R0	R0	R0	R0	R0	
4.2.11	BMXNRP0201: Ethernet RIO optical single mode repeater	R0	R0	R0	R0	R0	R0	
4.2.12	BMXNRP0201C: Ethernet RIO optical single mode repeater (Ruggedised - Conformal Coating)	R0	R0	R0	R0	R0	R0	
4.3	PLC Hardware - PLC Remote IO	R0	R0	R0	R0	R0	R0	
4.3.1	BMEXBP0800: PLC 8 slots Ethernet backplane	R0	R0	R0	R0	R0	R0	
4.3.2	BMEXBP0800H: PLC 8 slots Ethernet backplane (Ruggedised)	R0	R0	R0	R0	R0	R0	
4.3.3	BMEXBP0400: PLC 4 slots Ethernet backplane	R0	R0	R0	R0	R0	R0	
4.3.4	BMEXBP0400H: PLC 4 slots Ethernet backplane (Ruggedised)	R0	R0	R0	R0	R0	R0	
4.3.5	BMXXEM010: 5 PLC Rack protective covers (incl Above 4.2.5)	R0	R0	R0	R0	R0	R0	
4.3.6	BMECRA31210: X80 Performance Ethernet Drop adapter with Ethernet backplane	R0	R0	R0	R0	R0	R0	
4.3.7	BMECRA31210C: X80 Performance Ethernet Drop adapter with Ethernet backplane (Ruggedised – Conformal Coating)	R0	R0	R0	R0	R0	R0	
4.3.8	BMXNRP0201: Ethernet RIO optical single mode repeater	R0	R0	R0	R0	R0	R0	
4.3.9	BMXNRP0201C: Ethernet RIO optical single mode repeater (Ruggedised - Conformal Coating)	R0	R0	R0	R0	R0	R0	
4.3.10	BMXDDI3202K: 32 Digital 24 VDC positive logic input channels module	R0	R0	R0	R0	R0	R0	
4.3.11	BMXDDI3202KH: 32 Digital 24 VDC positive logic input channels module (Ruggedised)	R0	R0	R0	R0	R0	R0	
4.3.12	BMXFCW501 (32 Ch DDI): 5m pre-equipped cable with 1 x 40 way connector	R0	R0	R0	R0	R0	R0	
4.3.13	BMXDDI1602: 16 Digital 24 VDC positive logic input channels module	R0	R0	R0	R0	R0	R0	
4.3.14	BMXDDI1602H: 16 Digital 24 VDC positive logic input channels module (Ruggedised)	R0	R0	R0	R0	R0	R0	
4.3.15	BMXFTW501 (16 Ch DDI): 5m pre-equipped cable with 1 x 20 way spring type connector	R0	R0	R0	R0	R0	R0	
4.3.16	BMXDDO3202K: 32 Digital 24 VDC positive logic static output channels module	R0	R0	R0	R0	R0	R0	
4.3.17	BMXDDO3202KC: 32 Digital 24 VDC positive logic static output channels module (Ruggedised - Conformal Coating)	R0	R0	R0	R0	R0	R0	
4.3.18	BMXFCW501 (32 Ch DDO): 5m pre-equipped cable with 1 x 40 way connector	R0	R0	R0	R0	R0	R0	
4.3.19	BMXDDO1602: 16 Digital 24 VDC positive logic static output channels module	R0	R0	R0	R0	R0	R0	
4.3.20	BMXDDO1602H: 16 Digital 24 VDC positive logic static output channels module (Ruggedised)	R0	R0	R0	R0	R0	R0	
4.3.21	BMXFTW501 (16 Ch DDO): 5m pre-equipped cable with 1 x 20 way spring type connector	R0	R0	R0	R0	R0	R0	
4.3.22	BMXAMI0810: 8 Analog voltage/current input isolated high speed channels module	R0	R0	R0	R0	R0	R0	
4.3.23	BMXAMI0810H: 8 Analog voltage/current input isolated high speed channels module (Ruggedised)	R0	R0	R0	R0	R0	R0	
4.3.24	BMXFTW308S (8 Ch AI): 5m pre-equipped cable with 28 way terminal block connector	R0	R0	R0	R0	R0	R0	
4.3.25	BMXAMO0410: 4 Analog voltage/current output isolated channels module	R0	R0	R0	R0	R0	R0	
4.3.26	BMXAMO0410H: 4 Analog voltage/current output isolated channels module (Ruggedised)	R0	R0	R0	R0	R0	R0	
4.3.27	BMXFTW501S (4 Ch AO): 5m pre-equipped cable with 20 way terminal block connector	R0	R0	R0	R0	R0	R0	
4.3.28	BMXEHC0800: High Speed Counter 8 Channels with 10kHz frequency module	R0	R0	R0	R0	R0	R0	
4.3.29	BMXEHC0800H: High Speed Counter 8 Channels with 10kHz frequency module (Ruggedised)	R0	R0	R0	R0	R0	R0	
4.3.30	BMXFTW501S (8 Ch Counter): 5m pre-equipped cable with 20 way terminal block connector	R0	R0	R0	R0	R0	R0	
4.3.31	BMXFTB2010: 20-way removable terminal block with screw clamp (16 ch, DI)	R0	R0	R0	R0	R0	R0	
4.4	PLC Hardware - Safety Rated	R0	R0	R0	R0	R0	R0	

EXECUTION PHASE 1 & 2		Kendal ZAR	Secunda ZAR	Sasolburg ZAR	Klerksdorp ZAR	TLR IRP ZAR	Total PLMS ZAR	Comments
SUPPLY BILL OF QUANTITIES								
	Total	R0	R0	R0	R0	R0	R0	
	PCS Hardware/Computers	R0	R0	R0	R0	R0	R0	
	Metering Hardware	R0	R0	R0	R0	R0	R0	
	Network Hardware	R0	R0	R0	R0	R0	R0	
	PLC Hardware	R0	R0	R0	R0	R0	R0	
	PCS Panel Supply	R0	R0	R0	R0	R0	R0	
	PCS Licensing (SCADA, PLC)	R0	R0	R0	R0	R0	R0	
4.4.1	BMXCPS4002S: High power, redundant AC 110/220 VAC power supply	R0	R0	R0	R0	R0	R0	
4.4.2	BMEP582040S + BMEP58CPROS3: M580 CPU redundant family 40 with remote and distributed I/O, plus Coprocessor	R0	R0	R0	R0	R0	R0	
4.4.3	BMXSDI1602: 16 Digital Safety 24 VDC positive logic input channels module (SIL3)	R0	R0	R0	R0	R0	R0	
4.4.4	BMXFTB2010 (16 Ch DI Safe): 20 way screw clamp terminal block	R0	R0	R0	R0	R0	R0	
4.4.5	BMXSDO0802: 8 Digital Safety 24 VDC 0.5A positive logic static output channels module (SIL3)	R0	R0	R0	R0	R0	R0	
4.4.6	BMXSRA0405: 4 Isolated Digital Safety 24 VDC 5A positive logic static output channels module (SIL2)	R0	R0	R0	R0	R0	R0	
4.4.7	BMXFTB2010 (8 Ch DO Safe): 20 way screw clamp terminal block	R0	R0	R0	R0	R0	R0	
4.4.8	BMXSAI0410: 4 Analog Safety current input isolated channels module	R0	R0	R0	R0	R0	R0	
4.4.9	BMXFTB2010 (4 Ch AI Safe): 20 way screw clamp terminal block	R0	R0	R0	R0	R0	R0	
4.5	Instrument Safety Isolators/Barriers	R0	R0	R0	R0	R0	R0	
4.5.1	KFD2-CRG2-Ex1.D: Trip Amplifier (SIL 1)	R0	R0	R0	R0	R0	R0	
5	PCS Panel Supply	R0	R0	R0	R0	R0	R0	
5.1	Panel Supply	R0	R0	R0	R0	R0	R0	
5.1.1	PLC Panel Supply	R0	R0	R0	R0	R0	R0	
5.1.2	Remote PLC Panel Supply	R0	R0	R0	R0	R0	R0	
5.1.3	Metering Panel Supply	R0	R0	R0	R0	R0	R0	
5.1.4	Server Panel Supply	R0	R0	R0	R0	R0	R0	
5.1.5	Test Panel Supply	R0	R0	R0	R0	R0	R0	
5.1.5	Electrical MV ET Panel Supply	R0	R0	R0	R0	R0	R0	
6	AOSYS 2018 PCS Services (SCADA, PLC)	R0	R0	R0	R0	R0	R0	
6.1	NOC-MCC (OASyS SCADA - Enterprise Edition)	R0	R0	R0	R0	R0	R0	
6.1.1	Realtime Services – Hot	R0	R0	R0	R0	R0	R0	
6.1.2	Realtime Services – Standby	R0	R0	R0	R0	R0	R0	
6.1.3	Historical App Services – Hot	R0	R0	R0	R0	R0	R0	
6.1.4	Historical App Services – Standby	R0	R0	R0	R0	R0	R0	
6.1.5	Named Client License	R0	R0	R0	R0	R0	R0	
6.1.6	Engineering Station - Incl all required Services	R0	R0	R0	R0	R0	R0	
6.1.7	OASyS Enterprise OPC Server	R0	R0	R0	R0	R0	R0	
6.1.8	Playback Services	R0	R0	R0	R0	R0	R0	
6.1.9	OASyS Reporting Services	R0	R0	R0	R0	R0	R0	
6.2	NOC-DSS (OASyS SCADA - Enterprise Edition)	R0	R0	R0	R0	R0	R0	
6.2.1	Pipeline Operations – Liquids – Decision Support Environment (incl Reporting)	R0	R0	R0	R0	R0	R0	
6.3	STATION (OASyS SCADA - Enterprise Edition)	R0	R0	R0	R0	R0	R0	
6.3.1	Station OASyS – Hot	R0	R0	R0	R0	R0	R0	
6.3.2	Station OASyS – Standby	R0	R0	R0	R0	R0	R0	
6.3.3	Engineering Station - Incl all required Services	R0	R0	R0	R0	R0	R0	
6.3.4	Named Client License	R0	R0	R0	R0	R0	R0	
6.3.5	OASyS Reporting Services	R0	R0	R0	R0	R0	R0	
6.4	HMI TRAINER (OASyS SCADA - Enterprise Edition)	R0	R0	R0	R0	R0	R0	
6.4.1	Station OASyS - Administrator	R0	R0	R0	R0	R0	R0	
6.4.2	Engineering Station - Incl all required Services	R0	R0	R0	R0	R0	R0	
6.4.3	Named Client License	R0	R0	R0	R0	R0	R0	
6.4.4	Historical Database Server	R0	R0	R0	R0	R0	R0	
6.4.5	OASyS Reporting Services	R0	R0	R0	R0	R0	R0	
6.5	CUSTODY METERING (OASyS SCADA - Enterprise Edition)	R0	R0	R0	R0	R0	R0	
6.5.1	Pipeline Operations - Liquids – Flow Computer Management (FCM)	R0	R0	R0	R0	R0	R0	
6.5.2	Pipeline Operations - Liquids – BTM connector to Flow Computer Management	R0	R0	R0	R0	R0	R0	

EXECUTION PHASE 1 & 2		Kendal ZAR	Secunda ZAR	Sasolburg ZAR	Klerksdorp ZAR	TLR IRP ZAR	Total PLMS ZAR	Comments
SUPPLY BILL OF QUANTITIES								
	Total	R0	R0	R0	R0	R0	R0	
	PCS Hardware/Computers	R0	R0	R0	R0	R0	R0	
	Metering Hardware	R0	R0	R0	R0	R0	R0	
	Network Hardware	R0	R0	R0	R0	R0	R0	
	PLC Hardware	R0	R0	R0	R0	R0	R0	
	PCS Panel Supply	R0	R0	R0	R0	R0	R0	
	PCS Licensing (SCADA, PLC)	R0	R0	R0	R0	R0	R0	
6.5.3	Pipeline Operations - Liquids – Tank Management Application	R0	R0	R0	R0	R0	R0	
6.6	PIPELINE MONITORING	R0	R0	R0	R0	R0	R0	
6.6.1	Pipeline Operations – Liquids – Leak Detection	R0	R0	R0	R0	R0	R0	
6.6.2	Pipeline Operations – Liquids – Batch Tracking	R0	R0	R0	R0	R0	R0	
6.6.3	Pipeline Operations – Liquids – Theft Detection	R0	R0	R0	R0	R0	R0	
6.6.4	Pipeline Operations – Liquids – Pig Tracking	R0	R0	R0	R0	R0	R0	
6.7	PLC Licenses	R0	R0	R0	R0	R0	R0	
6.7.1	Control Expert XL Entity Licence	R0	R0	R0	R0	R0	R0	
6	AES202x PCS Services (SCADA, PLC)	R0	R0	R0	R0	R0	R0	
7.1	NOC-MCC (AES202x SCADA - Enterprise Edition)	R0	R0	R0	R0	R0	R0	
7.1.1	Realtime Services – Hot	R0	R0	R0	R0	R0	R0	
7.1.2	Realtime Services – Standby	R0	R0	R0	R0	R0	R0	
7.1.3	Historical App Services – Hot	R0	R0	R0	R0	R0	R0	
7.1.4	Historical App Services – Standby	R0	R0	R0	R0	R0	R0	
7.1.5	Named Client License	R0	R0	R0	R0	R0	R0	
7.1.6	Engineering Station - Incl all required Services	R0	R0	R0	R0	R0	R0	
7.1.7	AES202x Enterprise OPC Server	R0	R0	R0	R0	R0	R0	
7.1.8	Playback Services	R0	R0	R0	R0	R0	R0	
7.1.9	AES202x Reporting Services	R0	R0	R0	R0	R0	R0	
7.2	NOC-DSS (AES202x SCADA - Enterprise Edition)	R0	R0	R0	R0	R0	R0	
7.2.1	Pipeline Operations – Liquids – Decision Support Environment (incl Reporting)	R0	R0	R0	R0	R0	R0	
7.3	STATION (AES202x SCADA - Enterprise Edition)	R0	R0	R0	R0	R0	R0	
7.3.1	Station AES202x – Hot	R0	R0	R0	R0	R0	R0	
7.3.2	Station AES202x – Standby	R0	R0	R0	R0	R0	R0	
7.3.3	Engineering Station - Incl all required Services	R0	R0	R0	R0	R0	R0	
7.3.4	Named Client License	R0	R0	R0	R0	R0	R0	
7.3.5	AES202x Reporting Services	R0	R0	R0	R0	R0	R0	
7.4	HMI TRAINER (AES202x SCADA - Enterprise Edition)	R0	R0	R0	R0	R0	R0	
7.4.1	Station AES202x - Administrator	R0	R0	R0	R0	R0	R0	
7.4.2	Engineering Station - Incl all required Services	R0	R0	R0	R0	R0	R0	
7.4.3	Named Client License	R0	R0	R0	R0	R0	R0	
7.4.4	Historical Database Server	R0	R0	R0	R0	R0	R0	
7.4.5	AES202x Reporting Services	R0	R0	R0	R0	R0	R0	
7.5	CUSTODY METERING (AES202x SCADA - Enterprise Edition)	R0	R0	R0	R0	R0	R0	
7.5.1	Pipeline Operations - Liquids – Flow Computer Management (FCM)	R0	R0	R0	R0	R0	R0	
7.5.2	Pipeline Operations - Liquids – BTM connector to Flow Computer Management	R0	R0	R0	R0	R0	R0	
7.5.3	Pipeline Operations - Liquids – Tank Management Application	R0	R0	R0	R0	R0	R0	
7.6	PIPELINE MONITORING	R0	R0	R0	R0	R0	R0	
7.6.1	Pipeline Operations – Liquids – Leak Detection	R0	R0	R0	R0	R0	R0	
7.6.2	Pipeline Operations – Liquids – Batch Tracking	R0	R0	R0	R0	R0	R0	
7.6.3	Pipeline Operations – Liquids – Theft Detection	R0	R0	R0	R0	R0	R0	
7.7.4	Pipeline Operations – Liquids – Pig Tracking	R0	R0	R0	R0	R0	R0	
7.7	PLC Licenses	R0	R0	R0	R0	R0	R0	
7.7.1	Control Expert XL Entity Licence	R0	R0	R0	R0	R0	R0	
8	Additional Services (SCADA, PLC)	R0	R0	R0	R0	R0	R0	
8.1	OPC Bridge	R0	R0	R0	R0	R0	R0	
8.1.1	OPC Bridge Software	R0	R0	R0	R0	R0	R0	
8.1.2	OPC Bridge Software (Upgrade)	R0	R0	R0	R0	R0	R0	

EXECUTION PHASE 1 & 2		Kendal ZAR	Secunda ZAR	Sasolburg ZAR	Klerksdorp ZAR	TLR IRP ZAR	Total PLMS ZAR	Comments
SUPPLY BILL OF QUANTITIES								
	Total	R0	R0	R0	R0	R0	R0	
	PCS Hardware/Computers	R0	R0	R0	R0	R0	R0	
	Metering Hardware	R0	R0	R0	R0	R0	R0	
	Network Hardware	R0	R0	R0	R0	R0	R0	
	PLC Hardware	R0	R0	R0	R0	R0	R0	
	PCS Panel Supply	R0	R0	R0	R0	R0	R0	
	PCS Licensing (SCADA, PLC)	R0	R0	R0	R0	R0	R0	
8.2	Diagnostic Tools	R0	R0	R0	R0	R0	R0	
8.2.1	ACRONIS Backup Tool	R0	R0	R0	R0	R0	R0	
8.2.2	Microsoft Extra ID Diagnostics Audit Tool	R0	R0	R0	R0	R0	R0	

	Grade	Role Description	Rate ZAR/h	Rate US\$/h (Exch Rate: xx.xx)	Rate EURO/h (Exch Rate: xx.xx)
South African	SA01	Project Director	0.00		
	SA02	Project Manager	0.00		
	SA03	Project Engineer	0.00		
	SA04	Site Manager	0.00		
	SA05	SHE Specialist	0.00		
	SA06	Senior Control Engineer	0.00		
	SA07	Control Engineer	0.00		
	SA08	Junior Control Engineer	0.00		
	SA09	Technician	0.00		
	SA10	Junior Technician	0.00		
	SA11	Project Planner	0.00		
	SA12	CAD Operator	0.00		
	SA13	Project Support Co-ordinators	0.00		
International	IN01	Project Director		0.00	0.00
	IN02	Project Manager		0.00	0.00
	IN03	Project Engineer		0.00	0.00
	IN04	Site Manager		0.00	0.00
	IN05	SHE Specialist		0.00	0.00
	IN06	Senior Control Engineer		0.00	0.00
	IN07	Control Engineer		0.00	0.00
	IN08	Junior Control Engineer		0.00	0.00
	IN09	Technician		0.00	0.00
	IN10	Junior Technician		0.00	0.00
	IN11	Project Planner		0.00	0.00
	IN12	CAD Operator		0.00	0.00
	IN13	Project Support Co-ordinators		0.00	0.00

Part C3: Works Information



DESCRIPTION OF THE WORKS: FOR THE PROVISION OF DESIGN, ENGINEERING, SUPPLY, PROCUREMENT, FABRICATION, SOFTWARE DEVELOPMENT, TESTING, INSTALLATION, COMMISSIONING AND HANDOVER OF PROCESS CONTROL, INTEGRATED CUSTODY METERING AND PIPELINE MONITORING SYSTEMS TO ALL TRANSNET PIPELINES INLAND STATIONS, MASTER, AND SECONDARY CONTROL CENTRES – **MAIN AUTOMATION CONTRACT**.

INLAND NETWORK AUTOMATION PROJECT

MAIN AUTOMATION CONTRACT

Design, engineering, supply, procurement, fabrication, software development, testing, installation, commissioning and handover of the Process Control, integrated Custody Metering, and Pipeline Monitoring systems to all Inland stations, Master and Secondary Control Centres in accordance with the *Works* as specified in this document, other supporting documents and those evolved and developed during the execution of the *Works*.

Part C3.2 *Works* Information

DESCRIPTION OF THE WORKS: FOR THE PROVISION OF DESIGN, ENGINEERING, SUPPLY, PROCUREMENT, FABRICATION, SOFTWARE DEVELOPMENT, TESTING, INSTALLATION, COMMISSIONING AND HANDOVER OF PROCESS CONTROL, INTEGRATED CUSTODY METERING AND PIPELINE MONITORING SYSTEMS TO ALL TRANSNET PIPELINES INLAND STATIONS, MASTER, AND SECONDARY CONTROL CENTRES – **MAIN AUTOMATION CONTRACT.**

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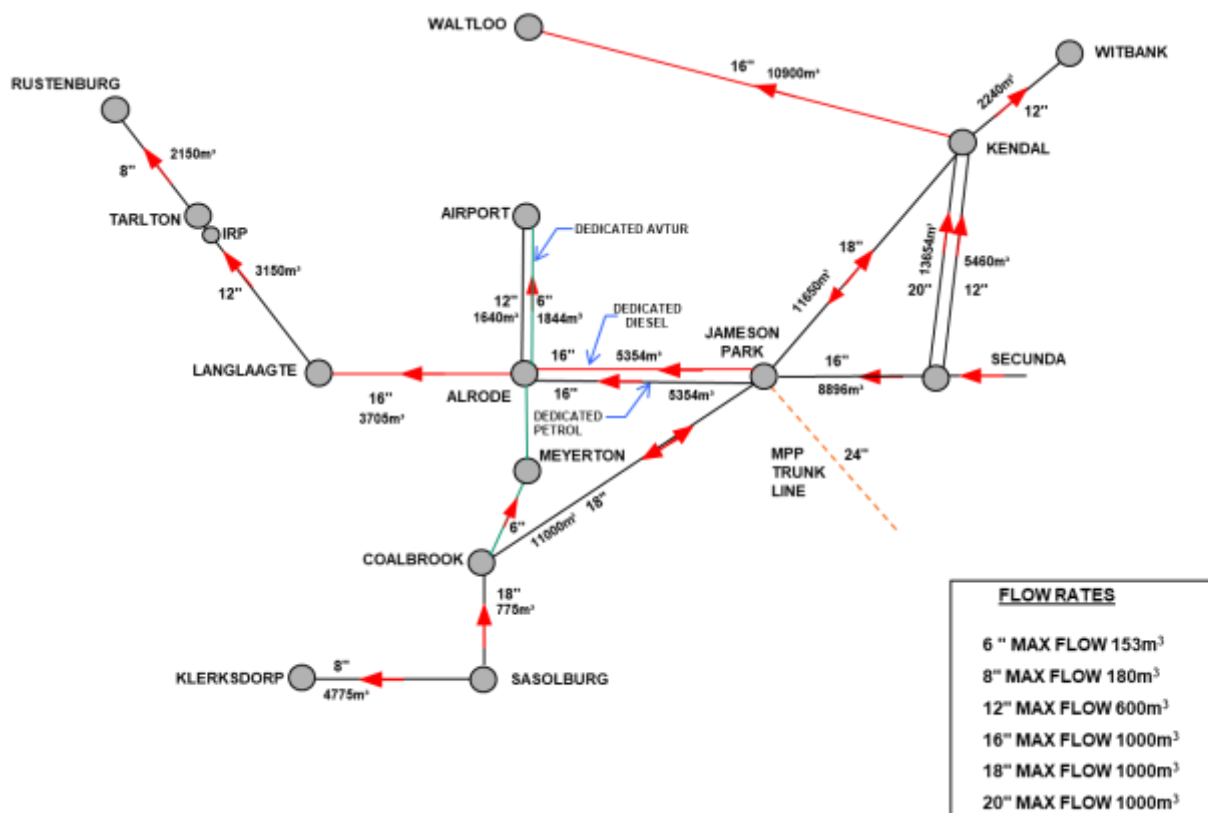
1. Introduction

1.1 Background

Transnet Pipelines, a division of Transnet SOC Ltd, provides strategic pipeline infrastructure with associated world class pipeline logistics for the petroleum and gas industries of South Africa. Established in 1965, Transnet Pipelines owns, maintains, and operates a network of some 3114km of high-pressure petroleum and gas pipelines. Transnet Pipelines transports an average of 16 billion litres of fuel per annum. This includes diesel, unleaded petrol, aviation turbine fuel and crude oil.

The Transnet Pipeline's pipeline network and associated infrastructure is geographically spread across five provinces. Transnet Pipelines transports petroleum products ranging from crude oil to refined products (Petrol, Diesel and Jet Fuel) through the pipeline network comprising of underground steel pipelines, intake and delivery depots and pump stations. These pipelines are laid within servitudes, which traverse through many properties (private, state owned, local authorities) with pump stations and intake and delivery depots located in rural, industrial and suburban areas along the pipeline routes. Motorised block valves are installed to protect sensitive areas in the event of critical failure of these pipelines.

Figure 1 – Transnet Pipelines Inland Network Infrastructure



PPT-1702/D

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The northern section of the network is referred as the Inland Pipeline Network and comprises several pipeline and pipeline segments as follows:

- a. Refined Product Network, comprising of the following stations:
 - Alrode (Delivery, Pump Station, Storage Depot)
 - Coalbrook (Delivery, Pump Station)
 - Jameson Park (Intake, Delivery, Pump Station, Storage Depot)
 - Kendal (Switching Station)
 - Klerksdorp (Delivery Station)
 - Langlaagte (Delivery, Pump Station, Storage Depot)
 - Rustenburg (Delivery Station)
 - Sasolburg (Intake, Pump Station)
 - Secunda (Intake, Pump Station)
 - Tarlton (Delivery, Pump Station, Storage Depot, Road & Rail Offloading, Additive Dosing, Refractionator)
 - Waltloo (Delivery Station, Storage Depot)
 - Witbank (Delivery Station, Storage Depot)
- b. Avtur Pipeline, comprising of the following stations:
 - Coalbrook (Intake, Pump Station)
 - Meyerton (Booster Pump Station)
 - Alrode (Pump Station)
 - Airport (Delivery Station)

All stations are remotely monitored and controlled from a Master Control Centre (MCC) located at the National Operations Centre (NOC) in Pinetown and from a Secondary Control Centre located in central Durban, KwaZulu Natal. The principal technologies used to meet this requirement are Supervisory Control and Data Acquisition (SCADA) systems interfaced to Programmable Logic Controllers (PLC), communicating across a Wide Area Network comprising microwave, frame relay and fibre optic communications equipment. Specialised metering systems are utilised to meter intake and delivery volumes to international custody transfer standards. Pipeline integrity is assured using software-based Realtime Pipeline Monitoring Systems.

The SCADA, PLC and Metering systems will hereinafter be referred to as the Process Control System (PCS), the Custody Metering System (CMS) and the Pipeline Monitoring System (PLMS). The existing Wide Area Network installed between the Master Control Centre and the respective stations will hereinafter be referred to as the WAN.

1.2 Project Background

The business requires a reliable PCS/CMS/PLMS that can be deployed throughout the pipeline network to ensure stable, reliable, and safe transportation of fuel to customers. Providing this need with the existing Automation Systems is currently challenged by obsolescence of the existing systems; high maintenance costs and frequent failure rates leading to performance and reliability issues; and a shortage of skilled personnel within the Original Equipment Manufacturers' (OEM's) to support these obsolete systems.

In order to address these risks, a project was recently undertaken by Transnet Pipelines to develop a new automated control, metering and pipeline monitoring system suitable for deployment to all intake, delivery and pump stations, as well as at a central master and secondary

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control centres (MCC, SCC), from where operation of all pipelines is controlled, managed and supervised. The newly developed Automation System has a sustainable useful life of > fifteen years (15), incorporate the latest control safety standards, and is able to be deployed throughout the TPL network.

This Automation System (hereinafter referred to as the OASyS DNA 2018 system) comprises of the following components:

- OASyS DNA 2018 SCADA System
- Schneider m580 PLCs for control and monitoring,
- Emerson S600+ Metering Flow Computers for custody metering.
- Pipeline Integrity Monitor (PIM) \ Simsuite software for leak detection functionality.

This PCS has been successfully deployed to all Crude Oil Pipeline stations as well as to areas within the Master Control Centre; with the project being successfully completed in 2022.

1.3 Employer's Objective

The existing Process Control Systems on the Inland Stations comprises of a mix of Siemens LSX and PCS7 SCADA Systems and Siemens S7 Programmable Line Controllers (PLCs), interfaced to Daniels micro5000, Emerson S600 and Emerson S600+ Flow Computers for custody metering. Atmos™ Pipe PLMS Software installed within the MCC currently provides pipeline monitoring functionality.

In order to address the obsolescence of these Process Control Systems (PCS), the *Employer* Transnet Pipelines (TPL), requires the deployment of a newly developed Automation System (AVEVA Enterprise SCADA, Schneider m580 PLCs, Emerson S600+ FC's, PIM PLMS) to the Inland Stations listed in Section 3.2.1 below, as well as at the master control centre (MCC) and secondary control centre (SCC), from where these operations are controlled, managed and supervised.

The strategic intent of this investment is to support Transnet Pipeline's business objectives of ensuring the security of supply to the South African inland market and is aligned to Transnet's overall business objectives.

1. In the Development Phase 1 of the project, the existing AVEVA OASyS DNA 2018 system is to be deployed in its current state to all Inland Avtur stations,
2. In the Development Phase 1 of the Project, the existing AVEVA OASyS DNA 2018 Global System library (Control Modules) and Metering System binaries are to be migrated to the latest version of AVEVA Enterprise SCADA (AES), and functionality further developed for deployment to Inland Multiproduct stations, and
3. In the Execution Phase 2 of the project, this newly developed AES System is to be deployed to all Inland Multiproduct stations.

1.4 Employer's Imperatives

Strategic Imperative – Deployment of the newly developed PCS solution to all Transnet Pipeline Inland Network stations owned and operated by the *Employer*, ensuring that the solution has a >15 year support life;

Business Imperative – Deployment of a solution that enables the *Employer* to achieve his operations availability, reliability, safety and environmental requirements, with the solution's cost of ownership being on par with pipeline industry benchmarks;

Technical Imperative – Deployment of a solution that meets the *Employer's* specified performance requirements; and is compatible with the *Employer's* low bandwidth and high latency data communications network constraints.

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1.5 Project Intent

The goal of the project is the deployment of these automation solutions to all Inland stations, as well as to the Master and Secondary Control Centres, which is harmonized with the *Employer's* strategic, business and technical imperatives.

1.6 Document Usage

This document is intended to convey core requirements for the Inland Automation Upgrade Project – Main Automation Contract Scope of Works.

All requirements included here in should be traceable to lower level documents to ensure compliance.

In this document,

- the word shall is to be understood as a mandatory requirement,
- the word should as a preference,
- the word may as a permissive (i.e. neither mandatory nor necessarily recommended),
- and the word **will** as a declaration on behalf of something/ someone else.

The word **should** shall be treated as a requirement, although it is acknowledged that it may be negotiated based on appropriate justification.

Text indicated as '**Note**' does not form part of this specification. Notes aid the reader's understanding of the associated requirements.

1.7 References

Project Execution Receivables are detailed in [Appendix A: Project Execution Receivables].

Applicable Specifications and Standards are listed in Table 1-1, Table 1-2: Applicable *Employer* Specifications and Standards below, and includes both Project Wide and OASyS DNA SCADA Automation System specific standards and specifications. These standards and specifications shall be adhered to.

Applicable Regulations and Standards are listed in Table 1-4: Applicable Regulations and Standards – South African below, shall be adhered to.

Reference Specifications and Standards are listed in Table 1-4: Reference Specifications and Standards below.

Document Context

The following project document identifiers reference documents that were developed by previous projects:

- H354086 – Developed by Hatch as part of the Crude Upgrade project
- E354086 – Developed by MAC as part of the Crude Upgrade project
- 2684358 - Developed by NMPP Project

Document Cross-referencing legend

Cross-referencing Legend used within this document:

- Document Heading cross-references are indicated in the format x.x.x e.g. 1.6.1
- Reference Document cross-references are indicated in the format [xx] e.g. [12]

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1.7.1 Applicable Employer Specifications and Standards (Project Wide)

Table 1-1: Applicable *Employer* Specifications and Standards (Project Wide)

Ref	Title	Doc No.	Rev
[1]	Process Control System User Requirements Specification	TPL-TECH-I-C-SPEC-012	03
[2]	Custody Metering System User Requirements Specification (Integrated)	TPL-TECH-I-M-SPEC-011B	04
[3]	HMI Trainer User Requirements Specification	H354086-00000-270-078-0002	0
[4]	Control System Replay User Requirements Specification	H354086-00000-270-078-0003	0
[5]	Inland PLMS User Requirements Specification	H373204-PLMS-270-242-0001	0
[6]	Contractor Management Procedure	TRN-IMS-GRP-PROC-014	2.0
[7]	Contractor Compliance File Assessment Checker	TRN-IMS-GRP-TMP -014.11	2.0
[8]	TPL Drawing Standards	PL100	05
[9]	TPL Plant & Equipment Tag Numbering Standard	PL101	06
[10]	TPL Equipment, Instrument & Electrical Symbology Standards	PL102	03
[11]	General Drawing Standard and Handover of As-Built Documentation from TP to DO Work Instruction	PL103 TPL-TECH-DO-WI-001	08 01
[12]	Electrical Design Criteria	PL666	01
[13]	Process Control Network Standard	PL703	03
[14]	PLC, Metering and Server Panel Specification	E354086-00000-271-078-0025	02
[15]	Specification for Uninterruptible Power Supplies	PL720	04
[16]	Code of Practice for Cabling, Racking, Trenching & Earthing	PL727	11
[17]	Product Codes and Colours	2684358-P-SC0-CS-SP-001	00
[18]	Automation Software Lifecycle Requirements Specification	H354086-00000-270-078-0001	0
[19]	CMS Emerson Floboss S600+ Stream Flow Computer FDS	TPL-TECH-I-M-SPEC-016	4
[20]	CMS Emerson Floboss S600+ Prover Flow Computer FDS	TPL-TECH-I-M-SPEC-017	4
[21]	Safety Requirements Specification – General	H354086-00000-273-078-0001	0
[22]	Project Health and Safety Specification	H373204-00000-110-242-0001	0
[23]	Alarm Philosophy	H354086-00000-270-080-0001	B
[24]	Framework for Minimum Controls for Security in the Process Control Environment	TPL-TECH-MC&I-STD-PCE	3
[25]	NOC Migration Strategy	H373204-0099-270-242-0001	0
[26]	Baseline Health and Safety Risk Assessment	H373204-0000-110-060-0001	0
[27]	Inland Station Process Control System As-Is Design Basis	H373204-0000-270-610-0001	0
[28]	Inland Automation Project Document Handover Matrix	H373204-0000-720-026-0001	0
[29]	URS Compliance Assessment Matrix	E354086-00000-271-078-0019	01
[30]	Concept AVEVA Enterprise SCADA\OASyS Architecture	H373204-0000-270-256-0001	0
[31]	Concept Schneider PLC Architecture	H373204-0000-270-256-0002	0

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Ref	Title	Doc No.	Rev
[32]	Airport Avtur Metering Panel General Arrangement (Provisional)	H373204-0021-270-270-0001	0
[33]	Rustenburg Metering Panel General Arrangement (Provisional)	H373204-0026-270-270-0001	0
[34]	Airport Avtur PLC Panel General Arrangement (Provisional)	H373204-0021-270-270-0002	0
[35]	CBK Station Server Panel Layout Front View (Typical)	E354086-00017-271-272-0005	4
[36]	REMOVED	REMOVED	-
[37]	CBK Mainline Pump Manifold Discharge Pressure (SIL) 17-PT-323	H354086-00017-270-262-0110	1
[38]	CBK MV Panel Layout Pump 01 & Pump 02	E354086-00017-271-272-0006	3

1.7.2 Applicable Employer Specifications and Standards – OASys DNA 2018 As-Is

Table 1-2: Applicable *Employer* Specifications and Standards – OASys DNA 2018 As-Is

Ref	Title	Doc No.	Rev
[39]	OASys DNA SCADA Integrated HMI Style Guide	E354086-00000-271-078-0006	02
[40]	OASys DNA SCADA PCS SCADA System FDS	E354086-00000-271-056-0018	01
[41]	OASys DNA SCADA Configuration Plan	E354086-00000-271-078-0010	01
[42]	PCS PLC FDS	E354086-00000-271-078-0003	02
[43]	OASys DNA SCADA PCS Control Module Specification	E354086-00000-271-078-0005	10
[44]	OASys DNA SCADA PCS Report Plan	E354086-00000-271-078-0009	01
[45]	OASys DNA SCADA PCS SCADA/PLC Communications Plan	E354086-00000-271-078-0012	03
[46]	OASys DNA SCADA System Architecture Failure and Recovery Mode Analysis	E354086-00000-271-078-0013	03
[47]	OASys DNA SCADA PLC System Architecture Failure and Recovery Mode Analysis	E354086-00000-271-078-0016	02
[48]	OASys DNA SCADA PCS Diagnostic FDS	E354086-00000-271-078-0027	01
[49]	OASys DNA SCADA Leak Detection System FDS (Crude)	E354086-00000-271-078-0007	01
[50]	OASys DNA SCADA Pipeline Operations – Liquids Metering System FDS	E354086-00000-271-078-0020	01
[51]	OASys DNA SCADA PCS – Atmos Crude LDS Interface Control Document	E354086-00000-271-078-0029	BA
[52]	OASys DNA SCADA PCS HMI Trainer System FDS	E354086-00000-271-078-0004	03
[53]	OASys DNA SCADA PCS Replay Configuration Plan	E354086-00000-271-078-0011	01
[54]	OASys DNA SCADA PCS LAN Specification	E354086-00000-271-078-0002	01
[55]	OASys DNA SCADA PCS Network Security Specification	E354086-00000-271-078-0024	02
[56]	OASys DNA SCADA PCS Software Naming Standard	E354086-00000-271-050-0006	02
[57]	OASys DNA SCADA PCS Hardware Naming Standard	H354086-00000-270-078-0005	AC
[58]	OASys DNA SCADA PCS SCADA Software Coding Standard – Scripting	E354086-00000-271-050-0008	01

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Ref	Title	Doc No.	Rev
[59]	OASyS DNA SCADA PCS PLC Software Coding Standard	E354086-00000-271-050-0004	03
[60]	OASyS DNA SCADA PCS System Performance Specification	E354086-00000-271-078-0014	02
[61]	OASyS DNA SCADA PCS Metering – SAP Interface Control Document	E354086-00000-271-078-0015	01
[62]	OASyS DNA SCADA Alarm Configuration Database	H354086-00000-271-060-0001	E
[63]	OASyS DNA SCADA PCS Diagnostics FDS	E354086-00000-271-078-0027	01
[64]	SCADA System Architecture	E354086-00000-271-256-0002	10
[65]	Metering Test Panel	E354086-00000-271-272-0007	01
[66]	KVM Network Architecture	E354086-00099-271-256-0002	4

1.7.3 Applicable Regulations and Standards - South African

Note: Some of the standards are a suite of standards. The first in the suite has been referenced, but the entire suite is applicable.

Table 1-3: Applicable Regulations and Standards – South African

1.7.4 Reference Specifications and Standards

Table 1-4:

Ref	Title	Doc No.	Rev
[67]	The Occupational Health and Safety Act of South Africa	Act 85 of 1993	1993
[68]	Installation and maintenance of electrical equipment used in explosive atmospheres Part 1: Installations including surface installations on Mines	SANS 10086-1	Ed 4.01 2014
[69]	The Petroleum Industry Part 2: Electrical and other installations in the distribution and marketing sector Electrical Code	SANS 10089-2	Ed.4, 2010
[70]	The Classification of Hazardous Locations and the Selection of Apparatus for use in Such Locations	SANS 10108	Ed.6, 2014
[71]	Wiring of Premises: Part 1 Low Voltage Installations	SANS 10142-1	3.01 2012
[72]	The Selection, Handling and Installation of Electric Power Cables of rating not exceeding 33kV	SANS 10198 (1-14) Suite	Ed. 2 2010
[73]	Electrical Apparatus for Explosive Gas Atmospheres	SANS 60079 Suite	Ed. 5 2015
[74]	Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)	SANS 62262	Ed.1, 2004

Reference Specifications and Standards

Ref	Title	Doc No.	Rev
[75]	API - Manual of Petroleum Measurement Standards – Chapter 3.1A - Standard Practice for the Manual Gauging of Petroleum and Petroleum Products	API MPMS 3.1A	3rd Ed
[76]	API - Manual of Petroleum Measurement Standards – Chapter 3.1B - Standard Practice for Level Measurement of Liquid Hydrocarbons in Stationary Tanks by Automatic Tank Gauging	API MPMS 3.1B	3rd Ed

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Ref	Title	Doc No.	Rev
[77]	API - Manual of Petroleum Measurement Standards – Chapter 4.2 - Displacement Provers	API MPMS 4.2	3rd Ed
[78]	API - Manual of Petroleum Measurement Standards – Chapter 4.8 - Operation of Proving Systems	API MPMS 4.8	2nd Ed
[79]	API - Manual of Petroleum Measurement Standards – Chapter 5.3 - Measurement of Liquid Hydrocarbons by Turbine Meters	MPMS 5.3	5th Ed
[80]	Safety instrumented systems for the process industry sector – Part 1: Framework, definitions, system, hardware and software requirements	SANS 61511-1	2nd Ed, 2021
[81]	Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 1: General Requirements	SANS 61508-1	1st Ed, 2013
[82]	Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 2: Requirements for electrical/electronic/programmable electronic safety-related systems	SANS 61508-2	1st Ed, 2013
[83]	Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 3: Software Requirements	SANS 61508-3	1st Ed, 2013
[84]	Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 4: Definitions and Abbreviations	SANS 61508-4	1st Ed, 2013
[85]	Software Life Cycle Plan	IEEE/EIA 12207	2017
[86]	ISA-62443-1-1-2007, Security for industrial automation and control systems, Part 1-1: Terminology, concepts, and models	ISA-62443-1-1-2007	2007
[87]	ISA-62443-2-1-2009, Security for industrial automation and control systems, Part 2-1: Establishing an industrial automation and control systems security program	ISA-62443-2-1-2009	2009
[88]	ISA-TR62443-2-3-2015, Security for industrial automation and control systems, Part 2-3: Patch management in the IACS environment	ISA-TR62443-2-3-2015	2015
[89]	ANSI/ISA-62443-3-2-2020, Security for industrial automation and control systems, Part 3-2: Security risk assessment for system design	ANSI/ISA-62443-3-2-2020	2020
[90]	ANSI/ISA-62443-3-3-2013, Security for industrial automation and control systems, Part 3-3: System security requirements and security levels	ANSI/ISA-62443-3-3-2013	2013
[91]	Pipeline SCADA Security	API 1164	3rd Ed, 2022
[92]	API Pipeline SCADA Alarm Management	API RP 1167	2nd Ed

1.8 Glossary

1.8.1 General Abbreviations

Abbreviation	Definition
AES	AVEVA Enterprise SCADA

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Abbreviation	Definition
API	American Petroleum Institute
AV	Avtur product
BBBEE	Broad Based Black Economic Empowerment
CAV	Coastal Avtur product
CE	Compensation Event
CoE	Centre of Excellence (see Definition)
cFAT	Client Factory Acceptance Test
CMS	Custody Metering System
COP	Crude Oil Pipeline
DV	Displacement Volume (counters)
E&I	Electrical and Instrumentation
EA	<i>Employer's Agent</i>
ECC	Engineering and Construction Contract
EDMS	Electronic Document Management System
EDS	Engineering Design Specification
EIA	Environmental Impact Assessment
EPCM	Engineering, Procurement, Construction Management
EW	Early Warning
FAT	Factory Acceptance Test
FBS	Facility Breakdown Structure
FCU	Field Control Unit
FDS	Functional Design Specification
FEED	Front End Engineering & Design
FEL	Front End Loading
FOC	Fibre Optic Cable
GCIA	Transnet Group Capital Investment Assurance
HAZOP	Hazard and Operability Study/Assessment
HOST	"HOST" or SCADA based metering
HMI	Human Machine Interface
HSE	Health, Safety, Environmental
I/O	PCS Input/Output
IEEE	Institute of Electrical and Electronic Engineers
iFAT	Internal Factory Acceptance Test
IFCR	Issued for Client Review
IS	Intrinsically Safe
JIT	Just-in-time
LAN	Local Area Network
LDS	Leak Detection System
MAC	Main Automation <i>Contractor</i>
MCC	Master Control Centre
MDS	Metering Database System
MIS	Management Information System

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Abbreviation	Definition
MP	Multi-products
MTTF	Mean Time To Failure
MTTR	Mean Time To Repair
NEC	New Engineering Contract
O&M	Operating and Maintenance
OEM	Original Equipment Supplier (see Definitions)
OPC	Object Linking and Embedding (OLE) for Process Control
P&ID	Piping/Process & Instrumentation Diagrams
PCS	Process Control System
PDF	Portable Document Format
PEP	Project Execution Plan
PLC	Programmable Logic Controller
PLMS	Pipeline Monitoring System
PLP	Project Lifecycle Process
PM	<i>Project Manager</i> (NEC)
PMI	<i>Project Manager's</i> Instruction
PPM	Transnet Procurement Procedures Manual
PQP	Project Quality Plan
PSC	Professional Services Contract
PSR	Project Status Report
QM	Quality Management
RACI	Responsible/Accountable/Consult/Inform
RAT	Range Alarm Trip tables
RFI	Request for Information
RFP	Request for Proposal
SANS	South African National Standards
SAT	Site/System Acceptance Test
SCADA	Supervisory Control & Data Acquisition
SCC	Secondary Control Centre
SD	Supplier Development
SDS	Software Design Specification
SI	System Integrator
SIF	Safety Instrumented Function
SIL	Safety Integrity Level
SIS	Safety Instrumented System
SLCP	Software Lifecycle Plan
SOC	State Owned Company
TCCC	Transfer of Care Custody and Control
TEAR	Tender Evaluation and Recommendation
TPL	Transnet Pipelines
URS	User Requirement Specification
VM	Virtual Machine

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Abbreviation	Definition
WAN	Wide Area Network
WBS	Work Breakdown Structure

1.8.2 Station Abbreviations

Abbreviation	Definition
ALR	Alrode (Multi-products, Avtur)
APT	Airport (Avtur, Coastal Avtur)
CBK	Coalbrook (Multi-products, Avtur)
KDL	Kendal
KRP	Klerksdorp
LLA	Langlaagte
JMP	Jameson Park
MTN	Meyerton
PL0-BV R1A	Highgate Block Valve
PL2-MBV	PL2 Pipeline Motorised Block Valve
PL3-MBV	PL3 Pipeline Motorised Block Valve
PL4-MBV	PL4 Pipeline Motorised Block Valve
RTR	Rustenburg
SBG	Sasolburg
SEC	Secunda
TLR	Tarlton (Multi-products, Road and Rail Loading, Refractionator)
WAO	Waltloo
WIR	Witbank

1.8.3 Definitions

Term	Definition
Automation System - OASyS	The developed Automation System comprising of the following components: OASyS DNA 2018 SP2 SCADA interfaced to Schneider m580 PLCs for control and monitoring, and interfaced to Emerson S600+ Metering Flow Computers for custody metering. The OASyS DNA 2018 SP2 SCADA incorporates integrated PIM software for pipeline monitoring functionality.
Automation System – AES2x	The developed Automation System comprising of the following components: AVEVA Enterprise SCADA 202x interfaced to Schneider m580 PLCs for control and monitoring, and interfaced to Emerson S600+ Metering Flow Computers for custody metering. The AVEVA Enterprise SCADA 202x incorporates integrated PIM software for pipeline monitoring functionality.
Application Software	1. Software designed to fulfil specific needs of a user; for example, software for navigation, MIS, or process control. 2. Software that is specific to an application and is composed of programs, data, and documentation. 3. Software specifically developed for the project as part of the Works, which will include but is not limited to Process Control System Libraries, Process Control Application software (SCADA and PLC), Metering and Pipeline Monitoring Software.

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Term	Definition
Construction Language	Construction languages include all forms of communication by which a human can specify an executable problem solution to a computer. The simplest type of construction language is a configuration language, in which software engineers choose from a limited set of predefined options to create new or custom software installations. The text-based configuration files used in both the Windows and Unix operating systems are examples of this, and the menu style selection lists of some program generators constitute another. Toolkit languages are used to build applications out of toolkits (integrated sets of application-specific reusable parts), and are more complex than configuration languages. Toolkit languages may be explicitly defined as application programming languages (for example, scripts), or may simply be implied by the set of interfaces of a toolkit. Programming languages are the most flexible type of construction languages. They also contain the least amount of information about specific application areas and development processes, and so require the most training and skill to use effectively.
<i>Consultant</i>	In the context of this <i>Works Information</i> , the <i>Consultant</i> provides consulting engineering and other relevant services (ECM) over the Project Lifecycle associated with the Inland Network Automation Project. The <i>Consultant</i> shall function within the Project Owners Team led by Transnet Pipelines Project Manager with the aim of supporting all phases of the Project towards achieving a successful implementation of the Project.
Control Module	Collection of instructions in both PLC and SCADA which are collated into a reusable module. In the context of this <i>Works Information</i> a control module consists of: • PLC code, function blocks, with defined input/outputs • SCADA code, faceplate and associated scripts • Block Icons for the respective devices
Device Group	A Device Group is defined as a collection of devices, grouped both logically and functionally for the purposes of control and monitoring e.g. Receivers and Launchers
<i>Employer</i>	Transnet Pipelines, or their nominated representative.
PLP - Feasibility Phase	This project lifecycle phase develops and defines the selected project option from Pre-Feasibility and provides a control basis for implementation of the project. Typically, comprehensive basic engineering is required in order to produce a project definition package whereby a high level of confidence is attained regarding project implementation in terms of safety, quality, cost and schedule.
PLP – Bankable Feasibility Phase	This project lifecycle phase is the phase during which engineering is completed to the level required to execute the <i>Works</i> . In the context of this RFP, the activity includes development of Main Automation Contract scopes of work as detailed in the MAC <i>Works Information</i> document. A Gate Review Process is concluded at the end of this Phase to determine if the project progresses through to Execution and Closeout.
PLP – Execution & Closeout Phase	This project lifecycle phase is the phase during which the <i>Works</i> are executed and closed out. In the context of this RFP, the activity includes scopes of work detailed in this <i>Works Information</i> document; including but not limited to software engineering and development, procurement, manufacture, installation and construction, commissioning, handover and close-out.
Firmware	1. (software) The combination of a hardware device and computer instructions and data that reside as read-only software on that device. 2. (supervisory control, data acquisition, and automatic control) Hardware used for the non-volatile storage of instructions or data that can be read only by the computer. Stored information is not alterable by any computer program. 3. The combination of software and data that reside on read-only memory. 4. A program, typically stored in read-only memory, that controls a computer from the time that it is turned on until the time that the primary operating system assumes control of the computer.

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Term	Definition
Global	Common and/or applicable across the entire project.
<i>Main Automation Contractor (MAC)</i>	In the context of this <i>Works Information</i> , the Main Automation Contractor executes the <i>Works</i> (Main Automation Contract) involving the design, engineering, supply, procurement, fabrication, software development, testing, installation, commissioning and handover of the process control, integrated custody metering, and pipeline monitoring systems to all Inland stations, MCC and SCC.
Metering	Transnet Pipelines make use of two methods for measurement of product volumes at delivery and intake stations. The methods are defined as follows: 1. Custody metering with volume compensation for temperature, pressure and density is implemented for all products received from and delivered to TPL customers. Custody Metering complies with API standards for pipeline custody metering. Custody metering makes use of certified flow computers for volume compensation. 2. Host metering is used to measure product volume moving within the TPL network. The volume measurement is done within the SCADA system. Product measured volumes may in some instances be compensated for the effect of temperature, pressure or density. TPL uses Host metering for inter-tank transfers and blending.
Mode of Control	Location of control from which control is effected from. From a control system point of view this can be: • Station – Control is by the local station operator. Only commands originating from the Station are accepted. • MCC – Control is from the CO in the MCC in the NOC or SCC. Only commands originating from the MCC in the NOC or SCC are accepted. Note: Alarm annunciation and its associated acknowledgment follows Mode of Control. This functionality is currently handled by AOR in OASys 2018.
Mode of Operation	Location from which operation is effected from. From a control system point of view this can be, • Local – Operation of a device occurs either from the device itself (in the case of valve actuators) or from Starter Panels in the Switchgear Room (in the case of Motors). • Manual – Operation of a device occurs from the PCS System via the device faceplate. • Automatic – Operation of a device/group of devices occurs from the PCS System via control sequences.
<i>OEM CoE or AVEVA CoE</i>	Refers to AVEVA (OEM) Centre of Excellence for AVEVA Enterprise SCADA and PIM Pipeline Integrity Management software. This division provides oversight of the execution of the projects using their platforms, providing technical oversight and governance.
PC Sum	Provisional Cost Sum – A defined allowance which will be quantified once definition of the deliverable is confirmed. A Provisional Cost Sum is expended at the sole discretion of the <i>Employer</i> .
System	Hardware, software and firmware comprising a defined scope of operation and functional objective.
System Software	Software designed to facilitate the operation and maintenance of a computer system and its associated programs; for example, operating systems, assemblers, utilities.
Team	Is defined as a group of competent, qualified PLC and SCADA process control software development resources that are deployed to a specific software development work stream.

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Term	Definition
Thin-slice	The combined testing of a limited number of representative elements of system functionality at all levels of the system to confirm that the elements and demonstrated functionality satisfy the integrated system functional requirement and objectives. Thin-slice tests and evaluations form part of an agile development lifecycle, with the objective to confirm, as early in the development process as practical, that the requirements and objective have or will be met.

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2. General Description of the *Works*

2.1 Full Project Scope

The *Works* (Main Automation Contract) involves the design, engineering, supply, procurement, fabrication, software development, testing, installation, commissioning and handover of the process control, custody metering, and pipeline monitoring systems to all Inland Stations 2.3, Master and Secondary Control Centres in accordance with the requirements formulated in this *Works Information* and those evolved and developed during the execution of the *Works*.

The Automation System forming part of the *Works* shall be based on the newly developed Automation System, comprising of the following components:

- a. Process Control System (PCS), comprising of AVEVA OASyS DNA v 2018, interfaced to Schneider m580 PLCs for control and monitoring (Inland Avtur stations)
- b. Process Control System (PCS), comprising of AVEVA Enterprise SCADA, interfaced to Schneider m580 PLCs for control and monitoring (Inland Multiproduct stations)
- c. Custody Metering System (CMS) integrated into the PCS, interfaced into Emerson S600+ FC's for custody metering,
- d. Pipeline Monitoring system (PLMS) integrated into the PCS, and comprising of PIMTM PLMS functionality.
- e. Associated Local Area Network hardware, software, cabling and interfaces.

The full scope of the Project extends to successful execution and delivery of the following:

- a. The development, engineering, supply, testing, installation, commissioning and handover of an integrated process control, custody metering and pipeline monitoring system (jointly referred to as the 'Automation System'),
- b. Deployment of the Automation System to Inland Network stations in accordance with the requirements formulated in this *Works Information* and those evolved and developed during the execution of the *Works*,
- c. Deployment of the Automation System to the National Operations Centre (Master Control Centre) and TPL School of Pipelines (HMI Training systems),
- d. Deployment of Automation System core infrastructure at the Secondary Control Centre (SCC),
- e. Field E&I procurement, supply, installation, testing, commissioning and handover; after conducting a detailed site assessment for each site. Field electrical and instrumentation (E&I) engineering and designs associated with the automation upgrades will be performed by the Consultant,
- f. Interface to the existing WAN communication infrastructure, for purposes of interfacing the respective stations to the MCC and SCC,
- g. Operational Readiness provision, including O&M manuals, training, and upgrading of existing operating procedures applicable to the Automation System,
- h. Addition of the following Inland Stations: ALR (MP), and TLR (PLC1) to the existing HMI Trainer located at the Transnet Academy (Pinetown) to facilitate operational readiness.
- i. Provision of commissioning and maintenance spares inventory associated with the Automation System.

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2.2 Works System Requirements

The *Works* includes implementation of the following systems and related services:

2.2.1 System Architecture

The *Contractor* shall present an overall pipeline automation system architecture and individual Inland Station automation system architectures that provide an operable system solution for an integrated PCS, CMS and PLMS system.

The architectures shall reflect configurations that are tailored for each station, including the MCC and SCC. The architectures shall detail hardware architecture; including VM, server, client, printers, PLC, network LAN switches and failover configurations for all systems. A Preliminary Control System Architecture [30], [31] have been provided, as contained in Appendix A: Project Execution Receivables, and should be used as guidelines for design.

It is critical that the following issues are addressed in the proposed designs:

- a. Redundancy and availability – See Process Control URS [1] Section 3.81 et al.
- b. Functional Separation – Stations which include functional separate areas (eg. multiple pipeline manifolds) should be allocated separate controllers to allow independent maintenance.
- c. Ability to meet Performance - See OASyS SCADA PCS System Performance Specification [60].
- d. Limited or Complete Loss of Communications - See Process Control URS [1] Section 3.8, 3.9 et al.
- e. Islanded Operations - See Process Control URS [1] Section 3.7, 3.11 et al.
- f. Upgradeability impact on operations - See Process Control URS [1] Section 3.12 et al.
- g. Defined Failure Modes – The system shall be designed such that all failure modes are predictable, detectable and designed for. All failures shall be alarmed/evented. Refer to OASyS PCS System Architecture Failure and Recovery Mode Analysis [46], OASyS PLC System Architecture Failure and Recovery Mode Analysis [47].
- h. Proven in Use – The proposed architecture shall be currently installed and operational on other multi-product liquid petroleum pipelines elsewhere in the world. First-of-a-kind engineering should be minimised and declared in the RFP response. All interfaces to PLC/SCADA shall have been tested and in use already. All high risk areas where interfaces or systems are not well tested shall be declared in the RFP response.

2.2.2 Process Control System (PCS)

The Process Control System shall comply with the requirements as detailed in the Control System URS [1], and the relevant OASyS\AVEVA Enterprise SCADA Specifications 1.7.2, and includes:

- a. Software development:
 - i. Determine the project version to be used for AVEVA Enterprise SCADA with an impact assessment on current/existing TPL standard libraries and TPL custom metering applications.
 - ii. Migration of the existing standards (Global System library), including metering, to the selected project version of PLC development software and AVEVA Enterprise SCADA software.
 - iii. Validation and testing of the software standards (Global System Library) on the new platforms (documented FAT)
 - iv. Development of the new functionality (hardware and software) required for the project, including but not limited to,
 - Tank gauging
 - Host metering (non-custody)

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- Global System library updates to include new Control Modules, including but not limited to those associated with TLR IRP.
- v. Validation (internal and Client FAT) of updates to the functionality associated with the AVEVA Enterprise SCADA PCS Automation System, to the level of definition where such can be deployed into project execution, during the development phase of the project,
- vi. All new functionality shall be subject to thin-slicing to confirm functionality prior to commencement of full development.
- b. Staging of the full AVEVA Enterprise SCADA PCS associated with the Inland Multi-products Network (MCC Included) to confirm system architecture designs before detailed site development and deployment.
- c. Staging of the OASyS PCS associated with the Inland Avtur Station Network (MCC included) system to confirm system architecture designs before detailed site development and deployment.
- d. Development and deployment of the Automation System (process control, integrated custody metering, and pipeline monitoring systems) to the Inland AVTUR stations, MCC and SCC during the execution phase of the project using OASyS 2018 SP2 and existing TPL software libraries and metering software. Functionality shall be developed in accordance with the relevant OASyS SCADA Specifications 1.7.2, and the site specific EDS's finalised during the Execution Phase of the project,
- e. Development and deployment of the Automation System (process control, integrated custody metering, and pipeline monitoring systems) to the Inland Multiproduct stations, MCC and SCC during the execution phase of the project using the Project Standard AVEVA Enterprise SCADA and associated TPL software libraries and metering functionality developed during Phase1 of the project. Functionality shall be developed in accordance with the relevant AVEVA Enterprise SCADA Specifications developed as part of Phase 1 using the OASyS SCADA Specifications 1.7.2 as a basis, and the site specific EDS's finalised during the Execution Phase of the project.,
- f. Updates to all affected OASyS DNA and AVEVA Enterprise documentation Table 1-2 to an accurate current basis.
- g. PLC and SCADA including associated hardware, software, local area networks, IO, data archiving and replay functionality,
- h. Safety Instrumented Systems (SIS), including associated hardware and software, sensors, final element drive interfaces, field wiring. The design and certification of the SIS will be done by Employer,
- i. Interfaces to existing plant systems and equipment, in general including the re-use of existing sensors, actuators, field wiring. This includes interfaces to the following Tank Gauging Systems currently in use on TPL sites:
 - Rosemount Raptor Rader Level TGS with 2410 Hub and an FCU,
 - SAAB \ Rosemount Rex RTG 3950
- j. Interface to existing LV/MV panels, in general including the replacement of remote IO,
- k. Interface with existing station UPS
- l. Update of the PCS reporting to support all affected reports during development and identified in [44].

Concessions and deviations shall be declared and documented throughout the project lifecycle.

2.2.3 Custody Metering System (CMS)

The Custody Metering System shall comply with the requirements as detailed in the CMS URS [2], OASyS Pipeline Operations – Liquids Metering System FDS [50] and the relevant OASyS SCADA Specifications 1.7.2, and includes:

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- a. CMS shall be integrated with the Process Control System, and shall include associated panels, hardware, software, ticketing and data archiving.
- b. Software development:
 - i. Migration of the current/existing metering system (Global System binaries), to the selected project version of PLC development software and AVEVA Enterprise SCADA software.
 - ii. Validation of the existing metering system on new software versions and with non-custody metering impact (documented FAT)
 - iii. Configuration and deployment of the existing Custody Metering (Remote) solution based on OASyS DNA 2018, as defined in OASyS DNA SCADA Pipeline Operations – Liquids Metering System FDS [50], to cater for custody metering of product volumes via interface to Emerson S600+ Flow Computers for all Inland Avtur stations (APT).
 - iv. Configuration and deployment of the newly developed Custody Metering (Remote) solution based on the project standard AVEVA Enterprise SCADA, as defined in AVEVA Enterprise DNA SCADA Pipeline Operations – Liquids Metering System FDS [50] developed during Phase 1, to cater for custody metering of product volumes via interface to Emerson S600+ Flow Computers for all Inland Multiproduct stations (APT).
 - v. Development of Host Metering as defined in AVEVA Enterprise SCADA Pipeline Operations – Liquids Metering System FDS [50] to cater for the non-custody metering of volumes within the SCADA System in accordance with the relevant API calculations, via interface to flow meters and tank gauging systems connected directly to PLCs.
 - vi. Replication of Metering (custody and non-custody) data to SAP Landing tables within the MCC-DSS system, for onward access by SAP, ref [61].
 - vii. Validation (internal and Client FAT) of updates to the functionality associated with the Custody and Host Metering Systems, to the level of definition where such can be deployed into project execution, during the development phase of the project,
 - viii. All new functionality shall be subject to a thin-slice to confirm functionality before full development.
- c. Updates to all affected OASyS DNA and AVEVA Enterprise documentation Table 1-2 to an accurate current basis.
- d. Interface to existing Emerson Floboss S600+ flow computers, ref [19] and [20] for custody metering.
- e. Interface to existing analogue and pulse generated flow meters and tank gauging systems for non-custody metering.
- f. Interfaces to existing plant systems and equipment, in general including the re-use of existing sensors, actuators, field wiring,
- g. Update of the Metering reporting to support all affected reports from development identified in [44].

The CMS is only applicable at Inland sites with metering facilities are installed. Refer to the Station PCS Design Basis [Appendix B: Inland Station PCS Design Basis] for details.

Concessions and deviations shall be declared and documented throughout the project lifecycle.

2.2.4 Pipeline Monitoring System (PLMS)

The Pipeline Monitoring System shall comply with the requirements as detailed in the Inland PLMS URS [5], and the relevant OASyS SCADA Specifications 1.7.2, and includes:

- a. The Inland Avtur Pipeline Leak Detection system shall be implemented on the existing PIM LDS system.
- b. The Inland Multi Products PLMS shall be integrated with the AVEVA Enterprise Process Control System, using the following PIM real-time functionalities:

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- i. Leak Detection (using Pipeline Integrity Monitor),
 - ii. Theft Detection (Pressure Loss Leak Detection),
 - iii. Batch Tracking (for line fill),
 - iv. Pig and Sphere Tracking.
- c. The scope includes associated panels, hardware, software and data archiving.
 - d. Interfaces to existing plant systems, equipment and related systems.
 - e. The existing Atmos Pipe LDS system is required to remain active as each of the station PCS systems are upgraded. This will require a temporary interface to be developed between the AVEVA Enterprise SCADA PCS\OASyS PCS and the Atmos LDS installed in the MCC. Refer to [51] for details as to how this was implemented in recent projects.

Note:

- a. Jameson Park Tank Farm (JMP) will remain on PCS7 v9 and as a result, the final solution will require PIM to extract data from PCS7 for this site.
- b. Inland Motorised Block Valve Chambers (PL0-BV R1A, PL2-2, PL2-3, PL2-6, PL3-3, PL4-7, PL4-15) will remain on PCS7 v9 and as a result, the final solution will require PIM to extract data from PCS7 for these sites

Concessions and deviations shall be declared and documented throughout the project lifecycle.

2.2.5 System Simulation

Software functionality for stations shall be tested using system simulators having the following functionality:

- a. The PCS and CMS shall have the capability of simulating field inputs and other defined interface inputs (e.g. MODBUS, OPC).
- b. The simulation interface shall use the respective Inland Station HMI screens to support ease of simulation.
- c. The simulation subsystem shall:
 - Support the loading of scenarios for the field interface.
 - Automatically provide feedback in response to commands for all standard devices and equipment (e.g. valves, VSDs, motors, breakers).
 - Support the simulation of faults for all standard devices and equipment.
 - Operate without the need for field interface (IO) modules.

In this regard, simulation functionality has been built into all control modules currently existing within the TPL Library, and is activated/deactivated via a software download selector. All new control modules developed as part of these *Works* shall have similar simulation functionality programmed into the control modules.

2.2.6 HMI Training System

The HMI Trainer located at the Transnet Academy in Pinetown shall be updated as follows:

- a. PCS/CMS/PLMS software for the following Inland Stations: ALR MP(MP) and TLR (PLC1) shall be deployed to the existing HMI Trainer currently located at the Transnet Academy (Pinetown) to facilitate operational readiness.
- b. The Training System shall meet the requirements contained in OASyS PCS HMI Trainer System FDS [52] in terms of training and technical objectives and requirements.
- c. The HMI Trainer shall be implemented to enable training of operators on the new PCS, CMS and PLMS.

Note: The current Training system is deployed on OASyS 2018 SP2 [64].

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The *Contractor* shall propose a solution to integrate the Inland Multiproduct stations (developed on AVEVA Enterprise SCADA) with the existing training system currently deployed on OASyS 2018 SP2, with a minimum of new equipment, licenses and site works.

2.2.7 Field E&I Works

Field E&I procurement, supply, installation, testing, commissioning and handover. Note that Field E&I Installation Works will only be scoped after having conducted a detailed site assessment for each site in Phase 1, with award and execution of the *Works* in Phase 2.

Field electrical and instrumentation (E&I) engineering and designs associated with the automation upgrades will be performed by the *Consultant*.

2.2.8 Systems, Sub Systems, Elements and Components

The *Works* comprises the following Systems, Sub Systems, Elements and Components:

Table 2-1: Systems, Sub Systems, Elements and Components

System 1 – Process Control System		
Sub Systems	Elements	Components
Control.	SCADA.	Servers, hardware, software.
	PLC.	Hardware, software and associated periphery equipment.
	Historian.	Integrated Historian.
	Interfaces.	Interfaces: - Modbus TCP/IP - Atmos PLMS (OPC 2.0) - PCS7 PLMS - Variable Speed Drives (Profibus DP) - Tank Gauging Systems - SNMP devices - NOC Video Wall
	Replay.	Integrated Replay System.
Metering.	Flow Computer.	Hardware, software and associated periphery equipment.
	Integrated Custody Metering System (CMS).	Servers, hardware, software.
Tank Gauging.	Tank Gauging instrumentation	Probes, Transmitters / Hubs and communication interfaces
Road and Rail Loading/Off-Loading.	Batch Controllers.	Hardware, software and associated periphery equipment.
	Instrumentation.	
	Interfaces.	Interfaces: - RS485 (SAP ISOIL)
Safety Instrumented Systems.	Logic solvers and field devices (Line Overpressure and Tank Overfill Trips)	Associated loops, hardware and periphery equipment.

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System 1 – Process Control System		
Sub Systems	Elements	Components
	Safety Instrumented Systems (Tarlton Refractionator) PLC.	Hardware, software and associated periphery equipment.
MIS.	SAP.	SAP IS-OIL Interface, as per [54].
Existing PLMS System (Atmos Pipe)	OPC Interface LDS – Leak Detection System. PDTS – Pressure Dynamic Tracking System. BTS – Batch Tracking System. PTS – Pig Tracking System. OPT – Optimiser. SIM – Simulation Software.	OLE for process control central server. Atmos™ LDS. Atmos™ PTS. Atmos™ BTS. Atmos™ PTS. Atmos™ OPT. Atmos™ SIM.
Newly developed, integrated PLMS System (PIM)	OPC Interface LDS – Leak Detection System. PDTS – Pressure Dynamic Tracking System (Theft Detection). PTS – Pig Tracking System. OPT – Optimiser. SIM – Simulation Software.	OLE for process control central server. PIM™
HMI Trainer.	SCADA.	Standalone servers, clients, hardware, software.
System 2 – Process Control Network		
Sub Systems	Elements	Components
Wide Area Network (WAN). (Excluded from the <i>Works</i>)	Fibre Optic Network. Microwave Network.	Transmission and periphery equipment. Transmission and periphery equipment.
Local Area Network (LAN).	Local Control System Network. LAN WAN interconnection. PLC LAN. Metering LAN. Printers.	Transmission, routing and periphery such as: • Switches • Routers • Firewalls • Optic Link Module (OLM)

2.3 Inland Stations forming part of the Works

Automation System upgrades are required at the following Inland stations:

Refined Product (RPP) Stations (North):

- Alrode (ALR) MP Delivery, Pump Station, Storage Depot
- Langlaagte (LLA) Delivery, Pump Station, Storage Depot
- Tarlton (TLR) Delivery, Pump Station, Storage Depot, Road & Rail Offloading, Additive Dosing and Refractionator
- Rustenburg (RTR) Delivery Station

Refined Product (RPP) Stations (South):

- Sasolburg (SBG) Intake, Pump Station

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- Klerksdorp (KRP) Delivery Station

Refined Product (RPP) Stations (East):

- Secunda (SEC) Intake, Pump Station
- Kendal (KDL) Switching Station
- Waltloo (WAO) Delivery Station, Storage Depot
- Witbank (CBK) Delivery Station, Storage Depot

Avtur Pipeline Stations:

(Note that Coalbrook (CBK) Avtur Intake, Pump Station has already been upgraded to new Automation System in a previous project).

- Meyerton (MTN) Booster Pump Station
- Alrode (ALR) AV Pump Station
- Airport (APT) Delivery Station

For details of what these stations comprise of refer to Station PCS Design Basis [Appendix B: Inland Station PCS Design Basis], and the respective station P&IDs contained in [Appendix A: Project Execution Receivables].

A characteristic of the *Employer's* sites are that they are geographically distributed, with data connectivity to the MCC via a low bandwidth, high latency microwave communications network. Refer to PCS Network Standard [13] for details.

Note:

Although

- PL2-MBV2, MBV3, MBV6 Motorised Block Valves (3 of),
- PL3-MBV2 Motorised Block Valves (1 of),
- PL4-MBV7, MBV15 Motorised Block Valves (2 of),
- PL0-BV R1A Motorised Block Valve (Highgate),

form part of the Inland network, they are excluded from the changeover works, but are included in the PLMS works.

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3. MAC Works Execution

3.1 Execution Principles

- a. The *Contractor* shall ensure that system development and engineering are executed by teams with extensive pipeline and system specific experience.
- b. The *Contractor* shall ensure that system development, engineering and support skills transfer to the *Contractor's* South African team and to the *Employer*, and in a sustainable manner.
- c. The *Contractor* shall ensure that during Phase 1 and Phase 2, at least two SCADA\PLC\HMI software development teams shall be available to execute the works concurrently. A separate third team shall be available to execute the PLMS functionalities.
- d. Software and associated hardware configuration shall be developed in accordance with approved *Contractor's* Software Life Cycle Plan, which shall be compliant to the Automation Software Lifecycle Requirements Specification [18].
- e. The *Contractor* shall evaluate the specifications contained herein and submit recommendations based on the *Contractor's* past project experience where,
 - i. System complexity is increased due to a specific requirement,
 - ii. Past experience has shown better methods to perform similar functions,
 - iii. There is deviation from Industry standards.
- f. Traceability to specified requirements shall be monitored and tracked in a traceable manner throughout the project.
- g. Station changeover, commissioning and handover activities shall be performed sequentially (not concurrently).
- h. Execution Phase 2A (Avtur Line) shall be run concurrently with Development Phase 1 Works.

3.2 Project Phasing

The project is being executed on a phased basis to embed the following principles:

- a. Phases have been selected to minimise risks associated with:
 - i. Project execution,
 - ii. Interpretation and translation of requirements,
 - iii. System configuration to meet infrastructural constraints.
- b. There is clear demonstration of system compliance to performance requirements [60].

This implies that:

- i. An Employer's Design Review is held at key points in project execution.
- ii. Pre-engineering activities are conducted for the ensuing phase to expedite project delivery.

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Figure 3-1: Phasing Diagram

3.2.1 Project Phases

The *Works* (Main Automation Contract) comprises the following phases:

PHASE 1 DEVELOPMENT PHASE – During which the project-wide design standards are validated, designs are established for the entire project, and re-use engineering components are developed to the level required for deployment. The suitability of the Automation System solution will be confirmed by the *Consultant* together with the *Employer* prior to execution of the next phase.

PHASE 2 EXECUTION PHASE – Full automation upgrade of all Inland stations (including MCC, SCC). This Phase is further subdivided into the following groups for execution, in accordance with the approved NOC Migration Strategy [25]:

(2A) EXECUTION Phase 2A:

Comprising of the following Stations on OASys 2018 SP2 (including MCC interface):

- Meyerton MTN (Avtur Pipeline)
- Alrode ALR (Avtur Pipeline)
- Airport APT (Avtur and Coastal Avtur)

(2B) EXECUTION Phase 2B:

Comprising of the following Stations on AVEVA Enterprise SCADA (including MCC interface):

- Langlaagte LLA (Refined Products)
- Tarlton TLR (Refined Products; including Tank Farms, Road and Rail Loading/Offloading and Additive Dosing)
- Rustenburg RTR (Refined Products)
- Alrode ALR (Refined Products)

(2C) EXECUTION Phase 2C:

Comprising of the following Stations on AVEVA Enterprise SCADA (including MCC interface):

- Kendal KDL (Refined Products)
- Witbank WIR (Refined Products)
- Waltloo WAO (Refined Products)
- Secunda SEC (Refined Products)

(2D) EXECUTION Phase 2D:

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Comprising of the following Stations on AVEVA Enterprise SCADA (including MCC interface):

- Sasolburg SBG (Refined Products)
- Klerksdorp KRP (Refined Products)

(2E) EXECUTION Phase 2E:

Comprising of the following Stations on AVEVA Enterprise SCADA:

- Tarlton Refractionator TLR-IRP

These phases may run sequentially or concurrently, as determined by the *Employer*.

Note that engineering, commissioning, tuning and handover of the PLMS will be executed at the end of each of the Phases 2A, 2B, 2C and 2D on a per-phase basis, in order to expedite PLMS completion as soon as the Automation Systems at all relevant stations within a phase have been commissioned.

3.2.2 Sectional/Works Completion

In order to ensure compliance of the full integrated Automation System (PCS, CMS, PLMS) to performance and functional requirements, the following shall apply:

- a. Sectional Completion at each site shall only apply to system hardware, panels software and site Works. The warranty period associated with a station's hardware, panels and site Works shall commence at the station's sectional completion date.
- b. Works Completion (including automation system software), and commencement of the defect correction period, shall apply when all sites have been fully commissioned (whole of the *Works* completed), tested, and have been verified to comply with requirements in terms of performance and integrated functionality.

3.3 Schedule

The *Works* program shall comply with the following dates:

- (1) EXECUTION Phase 1 DEVELOPMENT Complete: estimated eleven (11) Calendar months after Main Automation Contract Start Date,
- (2) EXECUTION Phase 2 Multi-Station EXECUTION Complete: estimated five (5) Calendar years after Main Automation Contract Start Date.

Table 3-1 represents a provisional schedule which informs the *Employer's* dates above. The *Contractor* shall interrogate the execution timing to identify where opportunities exist to expedite the provisional schedule dates.

Final schedule dates will be finalised as part of the Main Automation Contract negotiations, and will be included in the Contract as *Key Dates*.

Table 3-1: Project Dates

No.	Parameter	<i>Employer</i> Schedule Dates (Completion)
1	MAC Contract Award	2024-12-12
2	Completion of DEVELOPMENT Phase 1	2025-10-24
3	Completion of Phase 2A Handover	2026-08-18
4	Completion of Phase 2A PLMS Handover	2026-11-02
5	Completion of Phase 2B Handover	2027-12-08
6	Completion of Phase 2B PLMS Handover	2028-04-06
7	Completion of Phase 2C Handover	2029-02-12

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No.	Parameter	Employer Schedule Dates (Completion)
8	Completion of Phase 2C PLMS Handover	2029-06-20
9	Completion of Phase 2D Handover	2029-09-18
10	Completion of Phase 2D PLMS Handover	2030-01-07
11	Completion of Phase 2E Handover	2029-04-30
12	Project Closeout	2030-02-25

3.4 Method Statements

The Method Statement requirements listed in the Tables below shall be complied with during the execution of the *Works*.

Table 3-2: Phase 1 Development Method Statement

No.	Parameter	Requirement
1	PCS/CMS/PLMS	
1.1	Execution Methodology - Client Interaction	The <i>Contractor</i> shall involve the <i>Employer</i> in all design aspects, in particular, • Workshop of designs • Thin-slice core concepts and at various stages of development and station engineering • Clarification of any requirements and make recommendations as detailed above.
1.2	Execution Methodology – AVEVA CoE Involvement	The <i>Contractor</i> shall ensure that the Aveva Petroleum Pipelines Centre of Excellence in Calgary (for PLC, SCADA, CMS, PLMS): • makes recommendations as regards the version of PLC development software and AVEVA Enterprise SCADA software to be used on the project • makes recommendations as regards migration of existing OASyS DNA 2018 systems (incl. custom metering binaries and SimSuite PIM Leak Detection) • is involved in the migration, validation, and testing of the existing PCS Global System library and Metering System binaries on the new platform to the level of definition where such can be deployed into project execution • is involved in the design, development, testing of the Phase 1 Development Works • reviews the final deliverables and signs off that they have been developed according to best practices. The sharing of responsibility between the Centre of Excellence and <i>Contractor</i> is documented and communicated to the <i>Employer</i> as part of the RFP response.
1.3	Location of Software Development Teams	SCADA and PLC Software Development teams shall be located locally in South Africa for the full duration of the undermentioned tasks in Phase 1: • <i>Employer</i> Requirements transfer • Migration, validation and testing of existing OASyS 2018 Software PCS Global System library and Metering System binaries on the new AES 202x platform • Software development, including thin slice tests and software reviews • Software Integration • Software iFATs and cFATs
1.4	Execution Methodology - Local Support	The <i>Contractor</i> shall ensure that the local centre is developed to be able to offer comprehensive support on products on offer for fifteen years. The transfer of knowledge should occur during the execution. The <i>Contractor</i> shall indicate as part of the Execution methodology, how the local office will be upskilled.

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No.	Parameter	Requirement
1.5	Method Statement – Quality	The <i>Contractors</i> Execution Methodology shall • be clear, concise and cover technical and project management aspects relevant to the project. • demonstrate how the Contractor will ensure safe work while not compromising quality of the deliverables. • include a high level project execution plan detailing each project stage (feasibility and execution as stated in the scope of work). • demonstrate an in-depth understanding of the deliverables listed.
1.6	Hold Points – Phase 1	The following items are considered hold points during the phase, • Completion of a Gap Analysis review of the existing TPL OASyS 2018 library and new developments in the AVEVA Enterprise SCADA baseline offering, as contained in the latest release of software. • Selection of version of PLC development software and AVEVA Enterprise SCADA software to be used on the project • Approval of the following: Tank Gauging functionality; Host Metering (non-custody), TLR IRP Control Module functionality; PLMS Pig Tracking and Theft Detection functionality. • Completion of Staging Setup (Including PLC and Metering test panel) • Employer involvement in Thin-slice testing • Software ready for Contractor iFAT • Software ready for Employer cFAT • End of DEVELOPMENT Phase Note: Each major development item (e.g. host metering, tank gauging, control modules et al) shall have its own QCP, lifecycle, FATs and hold points.
1.7	Thin-slice Testing – PCS/CMS	The following is a minimum of the PCS/CMS Thin-slice concepts which shall be performed and accepted by the <i>Employer</i>, Phase 1: Development • Tank Gauging functionality – faceplates, functionality. • Host Metering (non-custody) – faceplates, functionality. • Global System Library (Control Module) updates – faceplates, functionality. • Performance test of 300 instances of developed TLR IRP Control Modules (100 AIN, 100 DIN, 50 Valve 50 Pumps), in accordance with [60].
1.8	Thin-slice Testing – PLMS	The following is a minimum of the PLMS Thin-slice concepts which shall be performed and accepted by the <i>Employer</i>, Phase 1: Development • Thinslice PLMS Pig Tracking and Theft Detection – HMI, functionality • Thinslice PCS7 Interface (in MCC) to PIM • Validate existing Atmos Interface

Table 3-3: Phase 2 Execution Method Statement (PCS/CMS)

No.	Parameter	Requirement
2	PCS/CMS	
2.1	Execution Methodology - Client Interaction	The <i>Contractor</i> shall involve the <i>Employer</i> in all design aspects, in particular, • Workshop of designs • Thin-slice core concepts and at various stages of development and station engineering • Clarification of any requirements and make recommendations as detailed above.

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No.	Parameter	Requirement
2.2	Execution Methodology – AVEVA CoE Involvement	The <i>Contractor</i> shall ensure that the Aveva Petroleum Pipelines Centre of Excellence in Calgary (for PLC, SCADA, CMS), • is involved in the design, development, testing of the Phase 2 Execution Works • reviews the final deliverables and signs off that they have been developed according to best practices. The sharing of responsibility between the Centre of Excellence and <i>Contractor</i> is documented and communicated to the <i>Employer</i> as part of the RFP response.
2.3	Location of Software Development Teams	SCADA and PLC Software Development teams shall be located locally in South Africa for the full duration of the undermentioned tasks: • <i>Employer</i> Requirements transfer • Software development, including thin slice tests and software reviews • Software Integration • Software iFATs and cFATs • Commissioning
2.4	Execution Methodology - Local Support	The <i>Contractor</i> shall ensure that the local centre is developed to be able to offer comprehensive support on products on offer for fifteen years. The transfer of knowledge should occur during the execution. The <i>Contractor</i> shall indicate as part of the Execution methodology, how the local office will be upskilled.
2.5	Method Statement - Quality	The <i>Contractors</i> Execution Methodology shall • be clear, concise and cover technical and project management aspects relevant to the project. • demonstrate how the Contractor will ensure safe work while not compromising quality of the deliverables. • include a high level project execution plan detailing each project stage (feasibility and execution as stated in the scope of work). • demonstrate an in-depth understanding of the deliverables listed.
2.6	Hold Points – Staging (OASys 2018 SP2) Complete Setup	The following items are considered hold points during the phase (on a per Site Basis), • MCC and AVTUR Stations (incl CBK) Staged System ready for software development • MCC and AVTUR Stations (incl CBK) Staged System ready for Contractor iFAT • MCC and AVTUR Stations (incl CBK) Staged System ready for Employer cFAT
2.7	Hold Points – Staging (AES 202x) Complete Setup	The following items are considered hold points during the phase (on a per Site Basis), • MCC, SCC and All MP Inland Stations Staged System ready for software development • MCC, SCC and All MP Inland Stations Staged System ready for Contractor iFAT • MCC, SCC and All MP Inland Stations Staged System ready for <i>Employer</i> cFAT
2.8	Hold Points – Staging (OASys 2018 SP2 & AES) – Station Rollout	The following items are considered hold points during the phase (on a per Site Basis), • Station Software ready for Contractor iFAT • Station Software ready for Employer cFAT • Station Software ready for deployment to site
2.9	Hold Points – PCS/CMS	The following items are considered hold points during the phase (on a per Site Basis), • Station Software ready for Contractor iFAT • Station Software ready for Employer cFAT • Station Software ready for deployment to site

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No.	Parameter	Requirement
2.10	Thin-slice Testing – PCS/CMS	The following is a minimum of the Thin-slice concepts which shall be performed for the <i>Employer</i> during the station development, Phase 2: Execution • Station HMI Graphics for approval • New station functionalities (e.g. blending, routing, tank farm) • Safety system functionalities.

Table 3-4: Phase 2 Execution Method Statement (PLMS)

No.	Parameter	Requirement
3	PLMS	
3.1	Execution Methodology - Client Interaction	The <i>Contractor</i> shall involve the <i>Employer</i> in all design aspects, in particular, • Workshop of designs • Thin-slice core concepts and at various stages of development and station engineering • Clarification of any requirements and make recommendations as detailed above.
3.2	Location of Software Development Teams	PLMS Software Development teams are located locally in South Africa for the duration of the undermentioned tasks: • Employer Requirements transfer • Thin slice tests and software reviews • Software Integration • Software cFATs • Commissioning • Tuning
3.3	Execution Methodology - OEM Involvement	The <i>Contractor</i> shall ensure that • the OEM reviews the final development and signs off that it has been developed according to best practices.
3.4	Execution Methodology - Local Support	The <i>Contractor</i> shall ensure that the local centre is developed to be able to offer comprehensive support on all products on offer for fifteen years. The transfer of knowledge should occur during the execution. The <i>Contractor</i> shall indicate as part of the Execution methodology, how the local office will be upskilled.
3.5	Method Statement Quality	The <i>Contractors</i> Execution Methodology shall • be clear, concise and cover all technical and project management aspects relevant to the project. • demonstrate how the Contractor will ensure safe work while not compromising quality of the deliverables. • include a high level project execution plan detailing each project stage (feasibility and execution as stated in the scope of work). • demonstrate an in-depth understanding of the deliverables listed.
3.6	Hold Points – Phase 2 PLMS	Approval of the following concepts: • Approval of Simplified Process Diagrams • Approval of the following functionalities: Leak Detection, Pig Tracking and Theft Detection (Pressure Loss Leak Detection); • Employer involvement in Thin-slice testing • PLMS Software ready for Contractor iFAT • PLMS Software ready for Employer cFAT • PLMS Software ready for deployment to site

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No.	Parameter	Requirement
3.7	Thin-slice Testing - PLMS	The following is a minimum of the Thin-slice concepts which shall be performed for the <i>Employer</i>, Phase 2: • HMI Graphics for approval; • Leak Detection operation; • Pig Tracking operation; • Theft Detection operation; • Integration in AES 202x; • Integration to PCS7; • Integration to Atmos PIPE.

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3.4.1 Interaction with the *Employer's* staff

For project success high levels of *Employer* interaction are considered essential. In particular the intent is to:

- Ensure the *Contractor* has a deep understanding of the *Employer's* requirements.
- Prevent rework due to misinterpretation of the *Employer's* requirements.
- Expose the *Employer* to other methodologies which are common in the pipeline industry to refine the design.

3.4.2 Thin-slice interface and Hold Points

As indicated in Tables 3-2, 3-3, 3-4, selected key concepts shall be subject to Thin-slice testing and demonstration with the *Employer*. The intent of these is to:

- Prove the level of functionality.
- Prove the soundness of the concept.
- Review an aspect of the design before high levels of engineering on expended.
- Provide the *Employer* a visual review of the implementation.
- Provide proof that the quality procedures have been followed.
- Ensure the given functionality is fit for purpose and meets the stated requirement.
- All thin-slice demonstrations, findings and decision shall be documented in a thin-slice report.

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4. Detailed Works by Phase

4.1 Phase 1: Development

4.1.1 Phase Objectives

The Development Phase is the first phase in which project-wide design standards are validated, design concepts and designs are established for the entire project, and re-use engineering components are developed to the level required for deployment in the multi-Station execution phase.

Phase Objectives are as follows:

- a. Establishment and setup of key project, quality and safety management controls, including the following (*Consultant* and the *Contractor*):
 - i. Setup of integrated project control systems for document management, cost control, and project scheduling,
 - ii. Finalisation of document and drawing templates,
 - iii. Review and approval of Contractor Project documentation, including Project Execution Plans, Project Schedules, Health & Safety Plans, Quality Management Plans, and Risk Management Plans.
- b. Finalise the project system architectures and finalise all outstanding technical items.
- c. Establishment of the staging system for software development, testing and configuration on project hardware and development licenses.
- d. Stage the full inland control system including all servers, and workstations ready for detailed engineering in the next phase.
- e. *Contractor's* analyses and understanding of the *Employer's* requirements. This will be done via a Project Kick-off *Workshop* and Site familiarisation visits to all Inland Stations, the MCC and SCC; to be scheduled on commencement of the Contract.
- f. Finalisation of outstanding global system design concepts, through reviews and thin-slice demonstrations with the *Employer*, for PCS/CMS/PLMS and HMI Trainer systems. These include, but are not limited to the following activities:
 - i. A gap analysis is to be conducted between the existing TPL OASyS library (2018 release) and new developments in the AVEVA Enterprise SCADA baseline offering, as contained in the latest release of software. This will serve to inform if any updates to the TPL Library are required.
 - ii. Migration of the existing OASyS 2018 Global System Library and Metering System binaries to the selected Project version of AVEVA Enterprise SCADA and EcoStruxure Control Expert.
 - iii. Global System library updates to include new Control Modules.
 - iv. Development of Tank Gauging functionality (incl Tank States).
 - v. Development of Host Metering (non-custody) functionality.
 - vi. PLMS functionalities: Leak Detection, Pig Tracking and Theft Detection (Pressure Loss Leak Detection). Note that Batch Tracking functionality is not required to be implemented.
- g. Software development and testing of existing Global System library updates and new functionality (hardware and software) to the level of definition where such can be deployed into project execution.
- h. Updates to all TPL AVEVA Enterprise SCADA\OASyS Specifications as issued into the project (refer to 1.7.1). Updates to these documents will be based on the Global System Designs developed in this Phase of the project.
- i. Identification and procurement of long-lead items.

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- j. Field E&I Installation *Works*:
 - i. Detail all E&I Installation Works required to be completed for all Inland Stations and at the MCC and SCC; split into the individual phases 2A, 2B, 2C, 2D, 2E.
 - ii. Prepare for appointment of an E&I Installation Contractor to perform the E&I Installation *Works* at the start of Phase 2 Execution.

4.1.2 Employer Responsibilities

- a. Appoints and awards Main Automation Contract;
- b. Submits As-is receivables to the *Contractor*, as defined in Appendix [Appendix A: Project Execution Receivables];
- c. Reviews and approves *Contractor's*:
 - i. Project Execution Plan and supporting documentation.
 - ii. Project Schedule.
 - iii. Safety Plan.
 - iv. Project Quality Plan, Software Lifecycle Plan, Software Configuration Management Plan, and Quality Control Plans.
- d. Reviews and approves *Contractor's* procurement strategies, including long-lead items;
- e. Clarifies requirements in response to *Contractor* requests, to ensure that the *Contractor* has a comprehensive understanding of the project objectives, requirements and constraints;
- f. Reviews and approves *Contractor's*:
 - i. PCS/CMS/PLMS Global System designs, including Thin-slice test witnessing.
 - ii. PCS/CMS/PLMS Software designs, including Thin-slice, iFAT and cFAT test witnessing.
 - iii. PCS/CMS/PLMS Hardware standards.
- g. Supervises, reviews and approves system and software design, engineering and testing;
- h. Functional Safety engineering, SIS design, including SIL verification.
- i. Participates in the *Contractor's* tender document preparation, tender adjudication and award activities associated with the appointment by the *Contractor* of an E&I Installation Sub-contractor.

4.1.3 Contractor Responsibilities

4.1.3.1 Project, Quality & Safety Management:

- a. Performs Project, Quality & Safety Management activities for the full duration of the project.
- b. Develops Safety File in accordance with:
 - i. the *Employer's* Contract Management Procedure [6], and
 - ii. the *Employer's* Contractor Compliance File Assessment Checklist [7].

4.1.3.2 Project Setup:

- a. Attends a Project Kick-off Workshop and site familiarisation visits to assist in developing the *Contractor's* analyses of the *Works* and an understanding of the *Employer's* requirements.
- b. Works with the *Employer* and *Consultant* to establish and setup integrated project control systems for document management, cost control, and project scheduling. These systems shall be integrated across *Consultant*, *Contractor* and *Employer* workplaces.
- c. Develops a Project Execution Plan (PEP) and supporting procedures for the entire *Works* in accordance with the requirements of this *Works* Information.

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- d. Develops a Project Programme for the entire *Works* in accordance with the requirements of this *Works* Information and the Contract. Project Scheduling shall be done on MS Project 2010 or later.
- e. Develops a Project Safety Plan for the entire *Works* in accordance with the requirements of this *Works* Information.
- f. Develops a Project Quality Management Plan and supporting procedures for the entire *Works* in accordance with the requirements of this *Works* Information.
- g. Develops a Software Lifecycle Plan (SLCP) and supporting procedures for the entire software *Works* in accordance with the requirements of this *Works* Information, and in particular [18].
- h. Develops a Software Configuration Management Plan (SCMP) and supporting procedures for the entire software *Works* in accordance with the requirements of this *Works* Information, and in particular [18].
- i. Develops Quality Control Plans (QCPs) for Phase 1 and Phase 2 activities, which:
 - i. Are consistent with the approved PQP.
 - ii. Identify all the tasks/steps pertaining to the *Works*.
 - iii. Identify the quality control points pertaining to the *Works*.
 - iv. Identify the quality controlling procedures and documents.
 - v. Identify the roles and responsibilities of the *Contractor* and *Employer* insofar as the quality control hold points.
 - vi. The various software QCP shall include hold points which comprise of comprehensive peer reviews of the developed software standards by an OEM SME, prior to the software being released into use.
- j. Updates the Project Risk Register (Baseline) for the entire *Works* in accordance with the requirements of this *Works* Information.
- k. Works with the *Employer* and the *Consultant* to finalise document and drawing templates.
- l. Identifies, configures and deploys development tools (e.g. Jira) which has the ability to,
 - i. Allow geographical diverse teams to track anomalies and progress
 - ii. Allows version management and tracking of software in office and on sites
 - iii. Allows tracking of multiple sites and development streams.
 - iv. Allows reporting of software progress
- m. The tool(s) is configured as per the requirements of the SLCP and SCMP.

4.1.3.3 PCS/CMS/PLMS Development Staging System

- a. Establishes the PCS Staging system for development, testing and configuration of PCS, CMS, PLMS Software on his project hardware and development licenses. Ownership of the PCS Staging system (hardware, software, licences) will be transferred at the end of the project to the *Employer*.
- b. Procures associated:
 - i. PLC hardware,
 - ii. SCADA hardware (servers and workstations),
 - iii. Software licences,
 - iv. Network hardware, and
 - v. Server panels,
 - vi. PCS and Metering panels where required .
- c. Integrates the free-issued *Employer* issued metering test panel into the *Contractors* development area. Refer to attached GA [65].
- d. Designs, documents and develops the PCS\CMS Staging to,

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- i. Support Phase 1 software development
- ii. Support Phase 1 and 2 thin slices
- iii. Support staging of Execution Phase software with the addition of the station equipment.
- iv. Support PLMS development and FAT even after NOC deployment of the main PLMS system.

Note the following staging requirements :

- i. Phase 1 Software development
- ii. OASyS 2018 SP2 AVTUR including CBK, MCC and Phase 2A stations.
- iii. AES 202x MULTI-PRODUCTS including all Inland sites simultaneously to size databases and setup the servers and clients.
- iv. AES 202x MULTIPRODUCT Stations on a per Phase basis, prior to station roll-out.
- e. Deploys the Staging system as per *Contractors* design,
- f. Configures the staging system to support Phase 1 activities namely,
 - i. PCS Control System development
 - ii. CMS Metering Development
 - iii. Thin slice activities
 - iv. Proof of concept activities

4.1.3.4 PCS/CMS Global System Design

- a. Develops Control System Architectures for all Inland Stations, MCC, SCC and HMI Trainer Systems. These shall be based on the requirements listed in section 2.2.1.
- b. Validates the Equipment List and Preferred Vendor equipment as being suitable for use on the Inland network (Appendix F: Preliminary Equipment List and Appendix G: Preferred Vendor List). It is the *Contractor's* responsibility to ensure that all equipment is sized and selected to meet all functional and performance requirements.
- c. Verifies the fundamental requirements, conceptual architecture and development framework through tests on his development setup, witnessed and accepted by the *Employer*.
- d. Validates that the design governing documents are complete and accurate for the OASyS 2018 process control system. Where documentation requires updates for the integration of the Avtur stations, the *Contractor* updates to the required level of completeness. This includes all the documents listed in Section 1.7.2.
- e. Develops the design governing documents for the AES 202x process control system. This includes all the governing documents listed in Section 1.7.2 which shall be updated for AES 202x.
- f. Conducts a gap analysis between the existing TPL OASyS library (2018 release) and new developments in the AVEVA Enterprise SCADA baseline offering as contained in the latest release of software (202x release), and makes a recommendation as to the versions of AVEVA Enterprise SCADA and EcoStruxure Control Expert to be standardised upon. Provides advice to the *Employer* as regards whether any updates to the TPL Library and Metering binaries are required or not, as well as a development report to integrate them. Current versions of software deployed to sites are as follows:

Windows

- Microsoft Windows Server 2016 Standard, Build 14393
- Windows 10 LTSC, Version 1809

Schneider Unity Pro

- EcoStruxure Control Expert V14.1 – 191122A

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- License – Control Expert EXTRA LARGE (XL)

PIM (Simsuite)

- AVEVA Process Simulation version 4.3 .0.1189
- AVEVA Pipeline Integrity Monitor version 2021 SimConstruct version 7.1.7803.4891

OASyS

- AVEVA OASyS DNA 7.9 SP2 2018.

This analysis and report is to include the following:

- i. a review of the lifecycle, maturity and performance of the AVEVA Enterprise SCADA CRM control module suite (assuming this is the future direction of development within the AVEVA Enterprise SCADA Product Development Team). Note that TPL Control Modules developed thus far comprise of CRM objects (Flex-text and flex-object) inserted into composites, with labels and bitmaps super-imposed over CRM baseline functionality, to comply with TPL requirements.
- ii. a review of software updates (if any) that are required to be made to the existing Global System Library and Metering System binaries as a result of migration to the selected project version

4.1.3.4.1 *PCS/CMS Global System Design - Architecture*

- a. Develops a deployment strategy for modifications to OASyS 2018 SP2 for the addition of the AVTUR line. The strategy is to document all foreseen impacts and risks. This document will be updated in Phase 2 once the system has been staged.
- b. Develops an architecture and deployment strategy to maximise reuse of existing HMI Trainer infrastructure to support existing training system (based on OASyS DNA 2018) and the new training system (based on AVEVA Enterprise SCADA). The solution shall integrate with the existing training system with a minimum of new equipment, licenses and site works.
- c. Develops a IEC62443 risk assessments (high-level, vulnerability and cyber) , zoning and specification as per ISA 62443-3-2 [89] and ISA 62443-3-3 [90]. This shall be documented into a compliance report and risk assessments to ISA 62443-3-3 [90] and the Framework for Minimum Controls [24]. The documentation shall be maintained and updated as part of Phase 1 and Phase 2 as the design evolves.
- d. Develops an API1164 Rev 3 risk assessment [91]. This shall be documented into a compliance report and risk assessments to API1164 and the Framework for Minimum Controls [24]. The documentation shall be maintained and updated as part of Phase 1 and Phase 2 as the design evolves.

4.1.3.5 *PCS/CMS Global Software Development:*

- a. Migration of the existing OASyS 2018 Global System library (Control Modules) and Metering System binaries to the selected project version of PLC development software and AVEVA Enterprise SCADA software.
- b. Validation of final screen resolution to be used on AES 202x library. Migration of complete Global System library to the final screen resolution of 4k (3840x2160). Current resolution of the library is QHD (2560 x 1440). As part of the migration, all screen elements shall be resized, the scripts and code updated and sent for approval. All updated software\HMI elements shall be developed as per the approved software lifecycle (including revision control). All HMI elements, screen pop-ups, navigation, reports and other items covered in the HMI style guide [39] shall be updated. After completion the HMI style guide shall be updated to the new standards.
- c. Validation and testing of the software standards (Global System Library) on the new platforms as per the approved SLCP (full iFAT and cFAT).

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- d. The *Contractor* follows the quality standards and coding standard developed in this phase (Phase one). The required checks include,
 - i. PLC Code review performed by an independent qualified *Contractor* resource.
 - ii. Sample PLC Code review performed by an *Employer* resource.
 - iii. SCADA Code review performed by an independent qualified *Contractor* resource.
 - iv. Sample SCADA Code review performed by an *Employer* resource.
 - v. SCADA Graphics review performed by an independent qualified *Contractor* resource.
 - vi. SCADA Graphics review performed by an *Employer* resource.
 - vii. All Code reviews shall be documented with any issues tracked.
- e. Global Software Development for PCS/CMS/PLMS: Finalises outstanding global system design concepts, through reviews and thin-slice demonstrations with the *Employer*, for PCS/CMS/PLMS and HMI Trainer systems.

4.1.3.5.1 *Global Software Development – Control Module Library updates:*

- a. Finalises Control Module Global Software designs and updates the AVEVA Enterprise SCADA PCS Control Module Specification [43] based on the new control module functionality.
- b. Develops and tests all SIS certified control modules (SIL 1&2) for use in the Tarlton Refractorator PCS software, including but not limited to the following control modules:
 - i. Digital Input
 - ii. Digital Output
 - iii. Solenoid Valve (2xDI, 1xDO)
 - iv. Analog Input (4-20mA)

Confirms that all control modules required by the IRP plant are included in the basis library.

Note: It is expected that the *Contractor* maintains a version controlled library of all software for OASyS 2018, metering binaries and AES202x. At all phases, the *Contractor* shall track which versions are installed on which sites.

- c. Develops new typicals identified in the Control Modules Specification including standard functionality detailed in the existing inland PCS7 EDSs (Tarlton, Langlaagte et al) which are not yet developed in the Control Module Global Software Library including,
 - i. LV VSD
 - ii. Blending and Dosing (integration with Host metering and reporting)
 - iii. TLR Rail Moving Device (LV VSD Motor) - Refer to existing PCS7 TLR EDS.
 - iv. Road and Rail Signalling devices - Refer to existing PCS7 TLR EDS.
- d. Development of the required displacement volume (DV) counters and update of standard typicals to support volume-based interface management and volume-based flushing (MV Motors\VSDs, dual strainers, receivers\launchers). The DV counters shall support the development of complex manifolds.
- e. Development of a standard SCADA\PLC library to manage the display of coloured manifold segments based on the detected and tracked product within the manifold segment (DV counters).
- f. Development shall include both SCADA and PLC software, and shall comply with TPL Control Module Library standards [43] and simulation requirements in the Works Information 2.2.5. The *Contractor* makes recommendations to the *Employer* on his library requirements, where the requirements impose customisation.
- g. Development shall include a complex sample manifold with examples of all affected typicals for testing.

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4.1.3.5.2 *Global Software Development – Tank Gauging and Tank States functionality:*

- a. Finalises Tank Gauging System Global Software designs and updates the OASyS – Liquids Metering System FDS [50] to reflect the new functionality which includes Tank States, Quality and Handover. Refer to existing PCS7 TLR EDS for required functionalities.
- b. Develops and tests Tank Gauging functionality based on standard functionality available in the AVEVA Enterprise SCADA Liquids Management Suite, modified to comply with TPL Automation System standards, including:
 - Specific Station EDS requirements – refer to [Appendix A: Project Execution Receivables]. In this regard, attention is drawn to specific Tank Handover functionality between Intake and Dispatch Operations, as detailed in the existing PCS7 Tarlton EDS.
 - AVEVA Enterprise SCADA Integrated HMI Style Guide [39]
 - AVEVA Enterprise SCADA System FDS [40]
 - AVEVA Enterprise SCADA Pipeline Operations – Liquids Metering System FDS [50]
 - TPL Process Control System User Requirements Specification [1]
 - TPL Custody Metering System User Requirements Specification [2]
 - AVEVA Enterprise SCADA PCS Report Plan [44]
 - AVEVA Enterprise SCADA PCS Control Module Specification [43].
 - Tank Gauging System ICD.

The *Contractor* makes recommendations to the *Employer* on his requirements, where the requirements impose customisation.

- c. Develops Tank State functionality (state machine based) to support Tank Handover, including typical tank status functionality such as,
 - Inlet State,
 - Inlet Running State,
 - Source State selection and inhibits,
 - Source Transferring,
 - QC Required State,
 - Destination Transferring,
 - Circulation State,
 - Circulating State.
 - The final definitions and functionality to be determined as part of Phase 1 depending on native functionality of AVEVA Enterprise SCADA LMS.

4.1.3.5.3 *Develops and tests Host Metering functionality based on standard functionality available Host Metering (non-custody) functionality:*

- a. Finalises Host Metering Global Software designs and updates the AVEVA Enterprise SCADA Pipeline Operations – Liquids Metering System FDS which is based on the OASyS Pipeline Operations – Liquids Metering System FDS [50] to reflect the new functionality.
- b. Develops and tests Host Metering functionality based on standard functionality available in the AVEVA Enterprise SCADA Liquids Management Suite, modified to comply with TPL Automation System standards, including:
 - Specific Station EDS requirements – refer to [Appendix A: Project Execution Receivables]
 - AVEVA Enterprise SCADA Integrated HMI Style Guide [39]
 - AVEVA Enterprise SCADA Pipeline Operations – Liquids Metering System FDS [50]
 - TPL Process Control System User Requirements Specification [1]
 - TPL Custody Metering System User Requirements Specification [2]
 - AVEVA Enterprise SCADA PCS Metering – SAP ICD [61], where metering data is required to be transferred to SAP

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- AVEVA Enterprise SCADA PCS Report Plan [44]
- AVEVA Enterprise SCADA PCS Control Module Specification [43].

The *Contractor* makes recommendations to the *Employer* on his requirements, where the requirements impose customisation.

- c. The *Contractor* shall stage both Custody and non-custody metering as part of the testing. Any changes to common libraries or code between Custody and Non-Custody shall be declared and impact assessment made. Any changes to Custody metering either from system upgrade or host metering shall invoke full regression testing on the full dual manifold metering system. The full SLCP approved lifecycle shall be used for all development (QCPs, staging, thinslice, iFAT and cFAT).

4.1.3.6 PCS/CMS Global Software Validation and Testing:

- a. Develops and tests all software development, including existing Global System library updates and new functionality (hardware and software) to the level of definition where such can be deployed into project execution:
 - i. The *Contractor* is responsible for provision of staging facilities and software licensing to enable the development, testing and acceptance of the global libraries.
 - ii. The *Contractor* develops the PCS/CMS/PLMS software such that the requirements are complied with.
 - iii. As part of the development, the *Employer* conducts Thin-slice tests and evaluations.
 - iv. The *Contractor* develops documented acceptance test procedures to verify all aspects of the software.
 - v. When all software has been developed, the *Contractor* tests the software (may be witnessed by the *Employer*) in accordance with the procedures (Internal FAT), whereafter the *Contractor* implements all recorded anomalies
 - vi. When the iFAT is complete and validated by the *Employer*, the *Employer* tests the software in accordance with the procedures (Client FAT), whereafter the *Contractor* implements all recorded anomalies (defects).
 - vii. Following final *Employer* approval of the software standards, the configuration of each component is recorded in accordance with the *Contractor's* SCMP, and released for use, where after each software standard will be under formal change control procedure for the remainder of the project.
- b. Updates all of the AVEVA Enterprise SCADA Standards and Specifications. This includes, but is not limited to the following documents:
 - AVEVA Enterprise SCADA Integrated HMI Style Guide;
 - AVEVA Enterprise SCADA PCS SCADA System FDS;
 - AVEVA Enterprise SCADA PCS PLC FDS;
 - AVEVA Enterprise SCADA PCS Control Module Specification;
 - AVEVA Enterprise SCADA Pipeline Operations – Liquids Metering System FDS;
 - AVEVA Enterprise SCADA PCS Report Plan;
 - AVEVA Enterprise SCADA - SCADA System Architecture Failure Mode and Recovery Modes
 - AVEVA Enterprise SCADA - PLC System Architecture Failure Mode and Recovery Modes
 - Alarm Configuration Database [62];
 - AVEVA Enterprise SCADA - System Compliance Matrix.

4.1.3.7 PLMS Global System Design:

- a. PLMS (Inland Multi-products) shall be integrated with the Process Control System for the following real-time functionalities:

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- i. Leak Detection (using Pipeline Integrity Monitor),
 - ii. Theft Detection (Compensated Volume Balance),
 - iii. Pig and Sphere Tracking,
 - iv. Batch Tracking for line fill compensation.
 - b. This functionality shall be based on standard functionality available in the integrated AVEVA Enterprise SCADA PIM Suite, modified to comply with TPL Automation System standards, including:
 - Inland Pipeline Monitoring System (PLMS) URS [5]
 - AVEVA Enterprise SCADA Leak Detection System FDS
 - AVEVA Enterprise SCADA Integrated HMI Style Guide
 - AVEVA Enterprise SCADA PCS Report Plan
 - AVEVA Enterprise SCADA PCS Control Module Library standards.
 - c. LDS (Avtur Line and CBK-JMP) shall be integrated with the Process Control System for the following real-time functionalities:
 - i. Leak Detection (using Pipeline Integrity Monitor),
This functionality shall be based on standard functionality available in the integrated OASyS PIM \ SimSuite, modified to comply with TPL Automation System standards, including:
 - Inland Pipeline Monitoring System (PLMS) URS [5]
 - OASyS SCADA Leak Detection System FDS [49]
 - OASyS SCADA Integrated HMI Style Guide [39]
 - OASyS SCADA PCS Report Plan [44]
 - OASyS SCADA PCS Control Module Library standards [43].
 - d. Develops simplified process flow diagrams, which are based on the respective P&IDs, and which depict all PLMS instruments and product routes to be accommodated in the system, for all Inland pipeline segments and nodes (stations).
 - e. Finalises the PLMS FDS (existing OASyS LDS Specification [49] is used as a basis) based on the chosen PLMS system platform, overall PLMS architecture, Leak Detection, Theft Detection and Pig/Sphere Tracking functionalities, so that the Employer's requirements contained in the Inland PLMS User Requirements Specification [5] are complied with.
 - f. Selects the product standards for all PLMS hardware (incl. computer and network equipment), and software products.
 - g. Designs the PLMS to comply with the design bases established during Phase 1, and receivables Appendix A: Project Execution Receivables, to the level of detail required for procurement and software development to commence in Phase 2.
 - h. Develops and tests interfaces to
 - i. "AES to Atmos Pipe" - to support keeping the existing LDS operational until each full segment has been changed over,
 - ii. "PCS7 to PLMS" to support existing sites to permanently interface to PLMS.
 - i. Develops a deployment plan in conjunction with the *Employer*, indicating how and when segments will be deployed in relation to the station change over, taking into account maintaining Atmos PLMS operation. The plan should look at current Atmos data usage (e.g. instruments, route logic) to ensure Atmos remains functional during transition.
 - j. Develops PCS7 Interface Control Document (ICD) for the PLMS final interface to PCS7.
 - k. Updates and maintains the Atmos ICD for maintaining the existing PLMS functionalities.

4.1.3.8 Field E&I Installation Works for Inland Stations/MCC/SCC:

- a. Conducts an assessment of the Inland Stations, MCC and SCC sites to familiarise himself with the site requirements and constraints.

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- b. Develops detailed E&I Installation Scopes of Work and Bills of Quantity for all Inland Stations, MCC, and SCC, which will be used to appoint the Installation sub-contractor. The E&I Scopes of Work may include:
 - Panel mounting and installation works;
 - Panel modification and installation works;
 - Instrumentation supply, calibration and installation works;
 - Valve actuator supply, installation and configuration works;
 - Cable and racking supply and installation, termination works;
 - System network cabling supply and installation works;
 - System fibre optic cabling supply and installation works;
 - Control room furniture supply and installation works;
 - Control room refurbishment works;
 - Reinstatement of raised floors, general refurbishment post installation works;
 - HVAC supply works;
 - UPS supply and installation *works*.
- c. Whilst the E&I field designs and loop drawing development are performed by the *Employer*, the *Contractor works* with the *Employer* to ensure that the designs correctly reflect the PLC/IO part of the design
- d. For most Inland Stations, existing PLC Panels, underfloor cable trunking/racking, cabling and control desks will be re-used. As a result, the *Contractor's* design is required to be integrated within the existing Inland Station Control and Equipment Room infrastructure.
- e. For the MCC, existing equipment panels, underfloor cable trunking/racking and control desks will be re-used. As a result, the *Contractor's* design is required to be integrated within the existing MCC infrastructure.
- f. For the SCC, existing equipment panels, underfloor cable trunking/racking and control desks will be re-used . As a result, the *Contractor's* design is required to be integrated within the existing SCC infrastructure.
- g. For the HMI Trainer, existing equipment panels, underfloor cable trunking/racking and control desks will be re-used. As a result, the *Contractor's* design is required to be integrated within the existing HMI Trainer infrastructure.
- h. Prepares tender documentation, goes to market, completes tender adjudication and appoints an E&I Contractor to perform the E&I Installation Works in EXE Phase 2. Involves the *Employer* in all aspects of the tender document preparation and tender adjudication and award activities.

4.1.3.9 Procurement – Long-Lead Items (Inland Stations/MCC/SCC):

- a. Procurement is performed on per station, just-in-time basis, in order to ensure supplier warranties do not expire and the latest versions are supplied.
- b. Compiles a Procurement Tracking Register, to track all procurement activities.
- c. Procures all long-lead items (which may include system hardware, software and licenses) in accordance with the approved designs and the Equipment, Hardware, Software and Licence Specifications contained in Appendix F and delivers them back into project stores for use on the project.
- d. Long lead items may include the following:
 - i. Emerson S600+ CPU's (incl. firmware upgrade), cases, cover-plates.
 - ii. PLC Hardware
 - iii. System hardware, software and licenses.

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4.1.4 *Employer's Design Review*

Upon completion of the Development Phase deliverables, a formal design review shall be conducted. At the design review, the Owners Team shall, based on the presented deliverables:

- Assess if the technical requirements have been complied with; and
- Assess if the technical solution can be practically operated, maintained and adequately supported in the *Employers'* South African operating and maintenance environment;
- Assess, based on the *Contractor's* development and execution performance, if the risks associated with the remainder of *Works* is tolerable; and
- Assess if the Contractor has sufficient competent resources to complete multiple work streams during Phases 1 and 2.

Failure to comply with any of the above criteria shall constitute a 'no-go' outcome for the solution and the remainder of the *Works* will not progress to the next Phase.

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4.2 Phase 2: MULTI-STATION EXECUTION

4.2.1 Phase Objectives (Phase 2A, 2B, 2C, 2D, 2E)

Automation upgrades are performed at the all Inland Network stations as referenced in 3.2, at the Master Control Centre located in the National Operations Centre, and at the Secondary Control Centre in accordance with this *Works Information*.

Multi-Station EXECUTION has been split into five phases as detailed in section 3.2.1 above. The *Contractor* shall manage the *Works* in accordance with the approved project schedule, on a just-in-time, phase-by-phase, station by station basis.

Objectives for each of the multi-station execution phases (2A, 2B, 2C, 2D, 2E) are as follows:

4.2.1.1 Activities performed by the *Employer*:

- a. Engineering Activities (*Consultant*): INCLUDED FOR INFORMATION
 - i. Generation of detail design drawings for PLC, Metering, Electrical LV (PCS Interface), Electrical MV (PCS Interface) and Server Panels for all Inland stations, MCC and SCC; for use by the *Contractor* when executing panel build activities.
 - ii. Functional Safety Engineering: Completion of Station Safety Requirements Specifications, SIL (LOPA) Determination Reports, SIL Loop designs and certification for all Inland Stations.
 - iii. Development of Engineering Design Specifications (Software) for all Inland Stations and the MCC, for use by the *Contractor* when executing software development activities. Existing Inland Station EDSs and Line-wide philosophies to be used as a design basis.
- b. Field Engineering Activities (*Consultant*): INCLUDED FOR INFORMATION
 - i. Site Validation of all 'As-Is' documentation as issued by the Employer.
 - ii. Development of Field Engineering designs, including loop drawings (and associated IS loop certification activities), electrical schematic updates, and cable block diagram updates; as impacted by the *Works*. Final As-Built versions to be issued as part of the As Built data pack for each station/MCC/SCC, at the time of handover of each station to TPL Operations.

4.2.1.2 Activities performed by the *Contractor*:

- a. Inland Station, MCC and SCC Automation Systems: Design, Development, Engineering, Supply, Procurement, Fabrication, Software Development, Testing, Installation, Commissioning and Handover:
 - i. Completion of detailed hardware specification and software engineering on a phase by phase basis, in compliance with the requirements contained in the Works Information and based on the concepts established during Phase 1 DEVELOPMENT.
 - ii. Procurement of all hardware, software and licences in accordance with the approved designs.
 - iii. Procurement of (or modifications to) PLC, Metering, Electrical LV (PCS Interface), Electrical MV (PCS Interface) and Server Panels (or parts thereof) for all Inland stations.
 - iv. Completion of all hardware and panel FATs, where all hardware and panels are inspected and tested, and anomalies corrected and approved by the Employer, prior to release to site.
 - v. Procurement of all maintenance and commissioning spares.
 - vi. Development of station/MCC/SCC PCS/CMS/PLMS software in accordance with the station and line-wide philosophies and approved software standards and specifications.

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- vii. Completion of all PCS/CMS/PLMS software FATs, where all hardware and software is tested, and anomalies corrected and approved by the Employer, prior to release to site.
- viii. Development of system change-over plans, commissioning plans and risk reviews, that details the process of decommissioning the existing Automation system and changing over to the new Automation system on all sites.
- ix. Delivery of the FAT'd systems and equipment to site.
- x. Changeover and commissioning of the Automation System in accordance with the approved changeover and commissioning plans.
- xi. Handover of the completed Works, including as-built documentation, to the Employer, on a station by station basis, once commissioning of individual stations have been completed.
- b. HMI Trainer System:
 - i. Development and deployment of relevant Inland station PCS/CMS/PLMS software to the HMI Trainer currently located at the Transnet Academy (Pinetown) to facilitate operational readiness.
- c. Operations Readiness:
 - i. Train the *Employer's* Operations and Maintenance personnel on the Automation Systems (PCS/CMS/PLMS) installed on all Inland stations and at the MCC/SCC, to ensure operational readiness before the new automation systems are placed into operation at each of the sites.
- d. E&I Installation *Works*:
 - i. Appointment of an E&I Installation Contractor.
 - ii. Completion of the E&I Installation Works associated with the Inland stations, MCC and SCC, as determined in Phase 1 of the *Works*.

4.2.2 Employer Responsibilities

- a. Submits standards and specifications, and Inland Station/MCC site-specific As-is receivables to the *Contractor*, as defined in Appendix [Appendix A: Project Execution Receivables].
- b. Generates detail design drawings for PLC, Metering, Electrical LV (PCS Interface), Electrical MV (PCS Interface) and Server Panels for all Inland stations, MCC and SCC; for use by the *Contractor* when executing panel build/modification activities.
- c. Develops Engineering Design Specifications (Software) for all Inland Stations and the MCC, to guide MAC software development activities.
- d. Site Validates all 'As-Is' documentation as issued by the *Employer*.
- e. Develops Field Engineering designs, including loop drawings (and associated IS loop certification activities), electrical schematic updates, and cable block diagram updates; as impacted by the *Works*.
- f. Performs Quality activities allocated to the *Employer* in the approved *Contractor's* Project Quality Plan for the phase, e.g. review, inspection, witnessing.
- g. Clarifies requirements in response to *Contractor* requests, to ensure that the *Contractor* has a comprehensive understanding of the project objectives, requirements and constraints.
- h. Supervises, reviews and approves *Contractor's* Inland station and MCC/SCC PCS/CMS/PLMS system and application software, and participates in thin-slice tests and FATs.
- i. Supervises the *Contractor's* execution of overall *Works* on the Inland stations and MCC/SCC and participates in SATs.
- j. Participates in and approves equipment, panel and hardware FATs.
- k. Avails the following resources for training

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- i. Technical Maintenance Training: 10 Technicians;
- ii. Operations Training: 2 Trainers, 3 Senior Control Operations staff.
- l. Provides changeover shutdown windows, and coordinates changeover logistics.
- m. Assists with the coordination of process and operations commissioning.

4.2.3 Contractor Responsibilities

4.2.3.1 Project, Quality & Safety Management:

- a. Performs Project, Quality & Safety Management activities for the full duration of the project.
- b. Compiles and Maintains a Materials Management register for all hardware and equipment for the full duration of the project.
- c. Preparation and approval of Site Safety Files in accordance with *Employer's* Health & Safety Requirements and the Construction Regulations including,
 - i. the *Employer's* Contract Management Procedure [6], and
 - ii. the *Employer's* Contractor Compliance File Assessment Checklist [7].
- d. Management and supervision of E&I Installation Works in accordance with Employer's Health & Safety Requirements and the Construction Regulations.

4.2.3.2 PCS/CMS System Engineering (Inland Stations):

- a. Provides design inputs to station EDS and line-wide designs on a per station basis (designs done by the *Employer*).
- b. Completes detailed hardware and software engineering on a station by station basis, in compliance with the requirements contained in the *Works Information* and based on the concepts established during Phase 1 DEVELOPMENT. Designs include:
 - i. Network Cable Block and Topology Designs
 - ii. Product Standards document (hardware, software, licenses)
 - iii. PCS/CMS BOQs
 - iv. Field Equipment BOQs (Designs by *Employer*)
 - v. Panel Design Inputs (Designs by *Employer*)
 - vi. Loop Design Review Inputs (Loops by *Employer*)
- c. Develops and selects the product standards for all hardware (incl. computer and network equipment), and software products to be approved by the *Employer*.
- d. Compiles a commissioning and maintenance spares list, for initial spares procurement.
- e. As a minimum, the following documentation is generated on a per Station basis,
 - i. Station PLC FDS (station update)
 - ii. AVEVA Enterprise SCADA FDS (station update)
 - iii. Station FAT Procedure
 - iv. Station Software License Register
 - v. Station Configuration Sheets.

4.2.3.3 PCS/CMS System Engineering (MCC):

- a. Provides design inputs to line-wide designs on a per station basis.
- b. The *Contractor* develops an NOC Station System Changeover plan for the NOC addressing integration of the new sites at the MCC (screen resolution, Video wall interface, PLMS integration, Domain integration).
- c. Provides as a minimum the following functionalities at the DMZ (DMZ forms part of the MCC Architecture),

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- i. WSUS / ICE and AV distribution
- ii. Remote Access (RAS)
- iii. DMZ-DSS and DMZ-HDS
- d. Provides ACRONIS™ as a Software Backup Tool at all Inland Stations as well as the MCC. MiniNAS or portable hard drives to be provided for software backups, on a per station and MCC basis.
- e. Provides Microsoft Extra ID™ Audit Tool as an Audit Tool at the MCC.
- f. Makes recommendations for a suitable SCADA and PLC Software Versioning Tool to be used. Selection will be determined during Phase 1 of the project.
- g. Completes detailed hardware and software engineering, in compliance with the requirements contained in the *Works Information* and based on the concepts established during Phase 1 DEVELOPMENT (in particular with respect to the NOC Migration Strategy [25]). Designs include:
 - i. Network Cable Block and Topology Designs
 - ii. Patching and Video Wall Schedule
 - iii. PCS BOQs
 - iv. MCC SAT Procedure
 - v. MCC Software License Register
 - vi. MCC Configuration Sheets.
 - vii. Updated Firewall Configuration and specification [55].

4.2.3.4 PCS/CMS System Engineering (SCC):

- a. Completes detailed hardware and software engineering, in compliance with the requirements contained in the *Works Information* and based on the concepts established during Phase 1 DEVELOPMENT. Designs include:
 - i. Network Cable Block and Topology Designs
 - ii. Patching Schedule
 - iii. PCS BOQs
 - iv. SCC SAT Procedure
 - v. SCC Software License Register
 - vi. SCC Configuration Sheets.
 - vii. Updated Firewall Configuration and specification [55].

4.2.3.5 PCS/CMS System Engineering (HMI Trainer):

- a. Completes detailed hardware and software engineering, in compliance with the requirements contained in the *Works Information* and based on the concepts established during Phase 1 DEVELOPMENT:
 - i. Network Cable Block and Topology Designs
 - ii. Network Patching Schedule
 - iii. HMI Trainer BOQs
 - iv. FAT and SAT Procedure
 - v. OASyS 2018 \ AES 202x Changeover and Startup procedure.
 - vi. HMI Trainer Software License Register
 - vii. HMI Trainer Configuration Sheets.

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4.2.3.6 Procurement – General (Inland Stations/MCC/SCC/Transnet Academy):

- a. Procurement is performed on per station, just-in-time basis, in order to ensure the latest versions are supplied. Extended warranties (5 years) shall be provided on all network switches, servers and workstations.
- b. Compiles a Procurement Tracking Register, to track all procurement activities.
- c. Procures all system hardware, software and licenses in accordance with the approved designs and the Equipment, Hardware, Software and Licence Specifications contained in Appendix F.
- d. Appoints the E&I Installation Works subcontractor.
- e. Procures maintenance and commissioning spares.

4.2.3.7 Procurement, Fabrication, Testing, Delivery of Panels (Inland Stations/MCC/SCC):

Refer to Appendix D: Panel *Works* Design Basis (PLC, MET, SRV, LV, MV) for details.

4.2.3.7.1 Procurement - PLC Panels and Metering Panels

- a. Where PLC and Metering Panels are to be replaced; the *Contractor* procures, fabricates, tests and delivers new panels to site, ready for installation during changeover, on a just-in-time basis.
- b. Where PLC and Metering Panels are to be re-used; the *Contractor* procures, tests and delivers all equipment and materials to site, ready for installation during changeover, on a just-in-time basis. All equipment will be configured and tested prior to delivery to site.
- c. PLC Panels shall be constructed in accordance with:
 - approved engineering designs provided by the Employer [Appendix A: Project Execution Receivables],
 - Equipment, hardware, software and licence specifications contained in Appendix F,
 - PLC, Metering and Server Panel Specification [14].

4.2.3.7.2 Procurement - Server Panels

- a. *Contractor* procures, fabricates, tests and delivers new panels to site, ready for installation during changeover, on a just-in-time basis. Panels shall be constructed in accordance with:
 - approved engineering designs provided by the Employer [Appendix A: Project Execution Receivables],
 - Equipment, hardware, software and licence specifications contained in Appendix F,
 - PLC, Metering and Server Panel Specification [14].

4.2.3.7.3 Procurement - Electrical LV Panel, MV Panel Remote IO Interface

- a. Where LV Panel and MV Panel Remote IO Panel backplates are to be replaced; the *Contractor* procures, fabricates, tests and delivers panel backplates to site, ready for installation during changeover, on a just-in-time basis.
- b. Where LV Panel and MV Panel Remote IO Panel backplates are to be re-used; the *Contractor* procures, tests and delivers all equipment and materials to site, ready for installation during changeover, on a just-in-time basis. All equipment will be configured and tested prior to delivery to site.
- c. Backplates shall be populated with Remote IO Modules, power distribution and marshalling, in accordance with:
 - approved engineering designs provided by the Employer [Appendix A: Project Execution Receivables]
 - Equipment, hardware, software and licence specifications contained in [Appendix F: Preliminary Equipment List]

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- PLC, Metering and Server Panel Specification [14].

4.2.3.7.4 *Procurement - Common Testing Requirements*

- All panels shall be subject to Factory Acceptance Testing (Internal and Client) as per the following,
 - The *Contractor* shall develop a FAT Procedure for each panel which is approved by the *Employer*.
 - The *Contractor* performs an iFAT in accordance with the approved FAT procedure, and implements all recorded anomalies. Records of the iFAT activities are made available for inspection by the *Employer*.
 - The cFAT shall be performed on the station panel hardware which will be deployed to site.
 - The *Contractor* invites the *Employer* to the cFAT, which the *Employer* performs in accordance with the approved cFAT procedures.
 - The *Contractor* implements all recorded anomalies, which are formally approved by the *Employer*.
 - The *Contractor* documents the iFAT and cFAT in the FAT Record and issues to the *Employer*.
 - The *Contractor* redlines and returns all design documentation should any approved changes be required to the panel design.

4.2.3.8 Inland Station/MCC PCS/CMS Software Design, Development, Testing, and Integration Testing:

4.2.3.8.1 *Station Development - Staging – Avtur Stations (MTN, ALR AV, APT)*

- All Avtur stations (CBK AV, MTN, ALR AV and APT) are to be developed on the existing 2018 OASyS DNA PCS System within the MCC that currently hosts all Crude stations. The existing system comprises of the following versions of software:

Windows

- Microsoft Windows Server 2016 Standard, Build 14393
- Windows 10 LTSC, Version 1809

Schneider Unity Pro

- EcoStruxure Control Expert V14.1 – 191122A
- License – Control Expert EXTRA LARGE (XL)

PIM (Simsuite)

- AVEVA Process Simulation version 4.3 .0.1189
- AVEVA Pipeline Integrity Monitor version 2021 Simcontract version 7.1.7803.4891

OASyS

- AVEVA OASyS DNA 7.9 SP2 2018.

- The full existing Crude MCC stations are staged in the *Contractor's* offices, including CBK. The proposed new stations are added (MTN, ALR AV, APT). The impact of adding the new stations are analysed and an Integration Plan developed to ensure site additions do not adversely affect the overall system.
- The system is maintained during station development and the entire system is tested and developed to ensure the integration is seamless.

Note: The PLMS system will be developed on the Crude SimSuite Version and deployed with the AVTUR Line. The development is covered in 4.3.

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4.2.3.8.2 *Station Development – Software Development – Avtur Stations (MTN, ALR AV, APT)*

- a. The Contractor develops the AVTUR stations (MTN, ALR AV, APT) as per the requirements detailed in this section using OASyS 2018 SP2.

4.2.3.8.3 *Station Development – Staging – Inland Multiproduct Stations*

- a. Hosts a staging system such that MCC/SCC and Station systems can be developed and tested. This includes full metering, PLC and system services (e.g. domain).
- b. The staging system shall include as a minimum,
 - i. MCC Servers, domains and workstations
 - ii. SCC workstations and servers
 - iii. All Station servers and workstations
 - iv. All Engineering stations
 - v. Representative switches (not all required) and routing
- c. All stations shall be configured as per the architecture, database sized and communication paths configured. The staging should be maintained as Station Development proceeds and used during the quality processes (Thinslices, FAT).
- d. After the first line deployment, a duplicate of MCC equipment (and other similar equipment) which has been deployed shall be duplicated in the staging.
- e. The learnings of how deployment is to occur on the live system shall be documented in a detailed Inland Station Deployment Plan.

4.2.3.8.4 *Station Development – Software Development – All Inland Multi-product Stations*

- a. All Inland Multi-product Stations are to be developed on the selected project version of software (AES202x), as detailed in this section.

4.2.3.8.5 *Station Development – General Requirements*

- a. Follows the approved *Contractor* SLCP and approved software standards. In doing so:
 - i. The *Contractor* reviews and accepts existing Station PCS, CMS input documentation, comprising of EDS's, IO Lists, Range, Alarm and Trip Schedules, and Equipment Configuration Sheets.
 - ii. The *Employer* may assign one or more of his engineering resources to be based with the *Contractor's* software development team for the duration of the software development.
 - iii. The *Contractor* invites the *Employer* to a Station/MCC HMI Graphics review as early in the development as practical, whereafter the comments are implemented. The detailed findings of the HMI review are documented and submitted to the *Employer*.
- b. The *Contractor* follows the quality standards and coding standard developed in Phase 1. The required checks include:
 - i. PLC Code review performed by an independent qualified *Contractor* Resource.
 - ii. Sample PLC Code review performed by an *Employer* Resource.
 - iii. SCADA Code review performed by an independent qualified *Contractor* Resource.
 - iv. Sample SCADA Code review performed by an *Employer* Resource.
 - v. SCADA Graphics review performed by an independent qualified *Contractor* Resource.
 - vi. SCADA Graphics review performed by an *Employer* Resource.
 - vii. All Code reviews shall be documented with any issues tracked.
- c. The Contractor shall implement the software as detailed in the:
 - i. Station IO List (*Employer* supplied)
 - ii. Station EDS (*Employer* supplied)

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- iii. Station RAT (*Employer* supplied)
- iv. Approved Station Architecture
- v. Approved System FMEA
- vi. All documentation shall be redlined by the *Contractor* for any updates by the *Employer*.
- d. The *Contractor* shall maintain a "Master File" for each station for all documentation.
- e. The *Contractor* shall develop the required MCC functionalities as part of the Station engineering and this forms part of the iFAT/cFAT.
- f. The *Contractor* shall as part of the development,
 - i. Submit all HMI graphics for review during the development after internal validation has been performed,
 - ii. Thin-slice all new functionality during the development.

4.2.3.8.6 *Station Development – Station Testing and Validation*

- a. The *Contractor* performs the station software validation with a minimum of the following:
 - i. The *Contractor* develops software FAT procedures, and presents such to the *Employer* for approval, prior to the FAT. FAT Procedures shall be comprehensive to the degree that all software functionalities are tested and documented. The FAT procedures shall cover system architecture and device/security configurations, complete control functionality, HMI functionality, alarming functionality, reporting functionality, interfaces.
 - ii. The *Contractor* performs his own iFAT in accordance with the approved FAT procedure, and implements all recorded anomalies. Records of the iFAT activities shall be made available for inspection by the *Employer*.
 - iii. The cFAT shall be performed on the station hardware and software which will be deployed to site. The FAT shall include MCC functionalities and changes.
 - iv. The *Contractor* invites the *Employer* to the cFAT, which the *Employer* performs in accordance with the approved cFAT procedures.
 - v. The *Contractor* implements all recorded anomalies, which are formally approved by the *Employer*.
 - vi. The *Contractor* invites the *Employer* to a hardware/software integration test, which may coincide with the software FAT.
 - vii. The *Contractor* redlines the respective station EDS and line-wide documents, and associated design documents (to be accurate to the *Contractors* design): IO List, RAT schedule and submits to the *Employer* for update,
 - viii. The *Contractor* updates all documentation associated to the station including FDS, architectures, and other equipment configuration specifications and records to an "As-Built" status.

4.2.3.9 *Inland Station/MCC/SCC Installation, Changeover and Commissioning:*

- a. Delivers the FAT'd systems, equipment and materials to site, and performs the site *Works*, in accordance with approved engineering designs and specifications, and quality and safety management procedures.
- b. Develops an MCC Station Integration Procedure detailing specific software changes which must happen on all systems e.g. database updates, links, code changes etc. This document should be sufficiently detailed that any trained person can do the station integration at the MCC and site. This document shall be maintained as lessons are learnt with each station.
- c. Develops a Station System Change-over plan that details the strategy to be adopted when changing over the respective Inland stations to the new automation system. The changeover plan complies with the requirements stipulated in the NOC Migration Strategy

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- document [25]. As part of the review process with the *Employer*, the *Contractor* participates in a risk assessment/review with the *Employer*.
- d. The *Contractor* develops a SAT Procedure (based on the FAT Procedure) to be used to validate station software on site.
 - e. Develops a commissioning plan for each and every Inland Station, that details the process of decommissioning the existing control system, and installing and commissioning the new system. The commissioning plan complies with the requirements stipulated in the Changeover Plan and NOC Migration Strategy document [25]. As part of the review process with the *Employer*, the *Contractor* participates in a risk assessment/review with the *Employer*.
 - f. Once all site *Works* have been completed the *Contractor* requests the *Employer* to schedule a station changeover date. In doing so:
 - i. The *Contractor* inspects all site *Works*, to ensure that the *Works* have been completed,
 - ii. The *Contractor* then invites the *Employer* to conduct a Shutdown Readiness Inspection on site, in accordance with the TPL Standard Operating Procedure. All anomalies are recorded in a Punchlist Schedule, and categorised in terms of severity.
 - iii. The *Contractor* corrects all recorded anomalies, which are formally signed off by the *Employer*.
 - iv. The *Contractor* provides an Electrical Certificate of Compliance, and all associated documentation, test certificates etc. to cover all E&I *Works* completed,
 - v. Once all punch list items have been completed and relevant TPL stakeholders have signed the SOP, a shutdown date for the station is scheduled by the *Employer*.
 - g. The *Contractor* commissions the system in accordance with the approved commissioning plan and the approved SAT Procedure. The *Employer* participates in the commissioning. The results are documented in the SAT Records.
 - h. Once commissioning has been completed and the site handed over for beneficial use, the *Contractor* ensures that a complete set of maintenance manuals and red-lined As-Built documentation is left on site for maintenance purposes.
 - i. Immediately prior to commissioning, the *Contractor* configures a temporary interface between the new station PCS and the existing Atmos Pipe LDS system for the station being commissioned, at the NOC, to ensure that the Leak Detection functionality remains active until the new integrated LDS is commissioned for all the stations belonging to a phase.
 - j. In this regard, an "OASyS – Atmos" Interface OPC Server is available in the NOC for use by the *Contractor* should he wish. If this OPC Server is used, the *Contractor* will be required to perform the following work:
 - i. Provide or extend the licences for the Data Hub OPC Tunneller and the DataHub Bridging Add On, as well as OEM support for the duration of the contract;
 - ii. The following configuration will be required as minimum:
 - OASyS-Atmos
 - AES202x-Atmos
 - AES2020x-PCS7

Note: Additional licence will be required for the PCS7-AES202x interface and an extended the existing license as described above.
 - iii. Configure the individual station LDS tags within the OPC Server, on a station for station basis;
 - iv. Commission and test the LDS interface, on a station for station basis, during commissioning of the respective stations.
 - k. Refer to AVEVA Enterprise SCADA PCS – Atmos Crude LDS Interface Control Document [51] for details as to how this was implemented in recent projects.

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4.2.3.9.1 *NOC Specific Activities:*

- a. Prior to station changeover, the *Contractor* evaluates the MCC system health and reports all findings in the MCC Status Report. Any items which may impact the changeover shall be highlighted.
- b. The *Contractor* changes the MCC desk and screen assignments with each station commissioning as per the NOC Migration Strategy [25].
- c. The *Contractor* changes the MCC Video Wall interface with each station commissioning as per the NOC Migration Strategy [25]. (*Contractor* to reference and update NOC Video wall Patching drawing [66]). All E&I installation work will be scoped and covered as the E&I installation works scope in Phase 1.
- d. The *Contractor* develops, documents and updates the Diagnostics systems configuration for the new systems and updates all affected documentation.
- e. The *Contractor* develops the Replay configuration and deploys to the MCC along with the associated station deployment. The *Contractor* updates the respective Replay FDS as required [53].
- f. The *Contractor* updates the PLMS systems as required, as per 4.3
- g. The MCC is tested as per Station Validation as per 4.2.3.8.6 and commissioned as per 4.2.3.9.

4.2.3.9.2 *SCC Specific Activities:*

- a. The *Contractor* develops installs the SCC equipment as per the approved architecture.
- b. The *Contractor* develops a desk patching drawing to document the desk allocation.
- c. All E&I installation work will be scoped and covered as the E&I installation works scope in Phase 1.
- d. The SCC is tested as per 4.2.3.8.6 and commissioned as per 4.2.3.9.

4.2.3.10 *Inland Station/MCC/SCC Handover:*

- a. Once all site *Works* have been completed, the site cleared, the site commissioned and handed over to the Employer for beneficial use, and all documentation has been updated to "As Built" status; the *Contractor* invites the *Employer* to conduct a final site inspection. In doing so:
 - i. The *Employer* inspects all site *Works*, to ensure that the *Works* have been completed. This includes:
 - disposal of old panels, control desks, equipment as detailed in section 9, and the site is cleared of all construction materials, contractor's infrastructure etc.;
 - all outstanding punch list items have been closed out;
 - site validation of all As Built documentation.
 - ii. Assists the *Employer* in performing Automation System performance tests, to ensure compliance with the contracted AVEVA Enterprise SCADA PCS System Performance Specification [60].
 - iii. All anomalies are recorded in a Punchlist Schedule, and categorised in terms of severity
 - iv. The *Contractor* corrects all recorded anomalies, which are formally signed off by the *Employer*.
- b. De-establishes site.
- c. Hands over the maintenance spares to the *Employer*, associated with the site.
- d. Hands over the complete sites' systems data pack (As Built documentation) to the *Employer*.
- e. Hands over the complete sites' systems backup (on a portable drive) to the *Employer*.

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4.2.3.11 HMI Trainer - System Procurement, Fabrication, Software Design, Installation, Commissioning and Handover:

4.2.3.11.1 *Staging and Development*

- a. The current HMI trainer has CBK and DUZ software running on OASyS 7.9 2018 SP2. The current system is required to be kept operational in addition to the supply of new HMI functionality (not simultaneously required). (Refer to current HMI Trainer architecture [64])
- b. The supply of HMI Trainer on the Project revision of AVEVA Enterprise SCADA for the additional sites being added. The *Contractor*:
 - i. Supplies the required new Virtual Servers, Virtual PLC and Physical Clients to the Project Version.
 - ii. Validates full functionality of the system and documents the SAT with the *Employer*.
 - iii. The *Contractor* corrects all recorded anomalies, which are formally signed off by the *Employer*.
- c. *Works* involves the deployment of the following Inland Station PCS/CMS software to the HMI Trainer currently located at the Transnet Academy (Pinetown) to facilitate operational readiness:
 - i. ALR Multi-products (PLC1, PLC2)
 - ii. TLR (PLC1)
- d. The HMI Trainer shall be updated,
 - i. After the respective site has completed iFAT (including preparation for the new site (system updates and system FAT))
 - ii. After the respective site has completed cFAT (deployment version)
 - iii. To the final site version after commissioning.
- e. The HMI Trainer shall be implemented to enable training of operators on the new PCS and shall meet the requirements of the approved HMI Trainer FDS.
- f. The Contractor shall develop a HMI Trainer OASyS\AES2x Changeover Procedure to detail how the trainer can be changed from OASyS to AES2x and back.

4.2.3.11.2 *HMI Trainer Validation*

- a. The *Contractor* performs the HMI Trainer software validation with a minimum of the following:
 - i. The *Contractor* develops software FAT procedures, and presents such to the *Employer* for approval, prior to the FAT.
 - ii. The FAT shall be performed on the station hardware and software which will be deployed to site.
 - iii. The *Contractor* invites the *Employer* to the FAT, which the *Employer* performs in accordance with the approved FAT procedures.
 - iv. The *Contractor* implements all recorded anomalies, which are formally approved by the *Employer*.
 - v. The *Contractor* invites the *Employer* to a hardware/software integration test, which may coincide with the software FAT.
 - vi. Once the software FAT has been completed, the integration test has been completed and all anomalies corrected and signed off, the *Contractor* delivers the systems and equipment to the *Employer's* training facility.
 - vii. For each site deployment, the system shall be tested in the *Contractors* facilities before being deployed to the Transnet Academy (Pinetown) as per the sections above.

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4.2.3.11.3 HMI Trainer Commissioning

- a. The *Contractor* deploys the approved station software to the HMI Training System, and commissions the system in accordance with the approved commissioning plan. The *Employer* participates in the commissioning
- b. Once commissioning has been completed and handed over to the *Employer* for beneficial use, and all documentation has been updated to As Built status; the *Contractor* invites the *Employer* to conduct a final site inspection. In doing so:
 - i. The *Employer* inspects all site *Works*, to ensure that the *Works* have been completed. This includes:
 - all outstanding punch list items have been closed out;
 - site validation of all As Built documentation
 - ii. Assists the *Employer* in performing HMI Training System performance tests, to ensure compliance with the contracted AVEVA Enterprise SCADA HMI Trainer Specification [52]. All anomalies are recorded in a Punchlist Schedule, and categorised in terms of severity.
 - iii. The *Contractor* corrects all recorded anomalies, which are formally signed off by the *Employer*, updates all documentation to an as-built status, hands over the maintenance spares to the *Employer* associated with the site and hands over the complete sites' systems data pack (As Built documentation) to the *Employer*.
 - iv. The *Contractor* provides an Electrical Certificate of Compliance, and all associated documentation, test certificates etc. to cover all E&I *Works* completed,
- c. For each site deployment to the Transnet Academy (Pinetown), the commissioning requirements above shall apply.

4.3 Phase 2: PLMS EXECUTION

4.3.1 Phase Objectives

The Phase objectives are:

- a. Completion of detailed engineering and implementation of the PLMS on a phase by phase basis (Phases 2A, 2B, 2C, 2D), in compliance with the Works Information and based on the concepts established during Phase 1 DEVELOPMENT.
- b. Configuration of a temporary interface between the PCS and the existing Atmos Pipe LDS system at each station, to ensure that the Leak Detection functionality remains active until the new integrated LDS is commissioned for all the stations belonging to a phase.
- c. Configuration of permanent interface to PCS7 for the JMP segments.
- d. Train the Employer's operations and maintenance personnel on the PLMS as configured (applications training).
- e. Handover of a tuned PLMS in compliance with the requirements contained in the Works Information to the *Employer's* operations personnel on a phase by phase basis.

4.3.2 Employer Responsibilities

- a. Submits design basis, standards, site-specific specifications and as-built receivables to the *Contractor*;
- b. Performs Quality activities allocated to the *Employer* in the approved *Contractor's* Project Quality Plan for the phase, e.g. review, inspection, witnessing;
- c. Clarifies requirements in response to *Contractor* requests, to ensure that the *Contractor* has a comprehensive understanding of the project objectives, requirements and constraints;
- d. Supervises, reviews and approves *Contractor's* PLMS application software, and participates in thin-slice tests and FATs;

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- e. Avails the following resources for training
 - i. Technical Maintenance Training: 10 Technicians;
 - ii. Operations Training: 2 Trainers, 3 Senior Control Operations staff.
- f. Assists with the coordination of PLMS commissioning.
- g. Provides remote system access to the *Contractor* for instrument assessments and PLMS tuning.
- h. Corrects instrument defects and performance issued within 30 days of receiving the Instrument Performance Report.

4.3.3 Contractor Responsibilities

4.3.3.1 Project, Quality & Safety Management:

- a. Performs Project, Quality & Safety Management activities for the full duration of the project.

4.3.3.2 PLMS Procurement – General (Inland Stations/MCC/SCC):

- a. Procurement is performed on just-in-time basis, in order to ensure supplier warranties do not expire and the latest versions are supplied.
- b. Compiles a Procurement Tracking Register, to track all procurement activities.
- c. Procures all system hardware, software and licenses in accordance with the approved designs and the Equipment, Hardware, Software and Licence Specifications contained in Appendix F: Preliminary Equipment List.

4.3.3.3 PLMS Software Design, Development and Testing:

4.3.3.3.1 PLMS Development - Staging

- a. OASyS 2018 SimSuite\PIM – AVTUR SITES:
 - i. The *Contractor* shall stage the existing SimSuite\PIM system for the development of the Avtur PLMS functionalities.
 - ii. Development and FAT shall occur on the staged system.
 - iii. After completion of the cFAT, the *Contractors* shall develop a SimSuite PLMS Integration Procedure (SimSuite) detailing specific software changes which must happen on all systems e.g. database updates, links, code changes etc. This document should be sufficiently detailed that any trained person can do the station integration at the MCC and site.
- b. AES2x PIM – Inland MULTIPRODUCT SITES:
 - i. The complete PLMS system shall be staged at the *Contractor's* offices to support PLMS development.
 - ii. Once the system has been deployed to the NOC for the first line, the *Contractor* shall stage the deployed systems in the *Contractor's* offices to support further PLMS development.
 - iii. After completion of the cFAT, the *Contractor* shall develop a PIM PLMS Integration Procedure (AES2x) detailing specific software changes which must happen on all systems e.g. database updates, links, code changes etc. This document should be sufficiently detailed that any trained person can do the station integration at the MCC and site. This document shall be maintained as lessons are learnt with each line deployment.

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4.3.3.3.2 PLMS Development – Software Development

- 4.3.3.3.2.1 PLMS Development – Software Development - AVTUR Stations
- a. Develops the software in accordance with the approved OASyS LDS FDS. Functionality shall be based on standard functionality available in the integrated AVEVA Enterprise SCADA SimSuite\PIM Suite, modified to comply with TPL Automation System standards, and shall include the following PLMS real-time functionalities:
 - i. Leak Detection, in compliance with [49]
- 4.3.3.3.2.2 PLMS Development – Software Development - Inland MULTIPRODUCT Stations (incl. PL0, PL2, PL3, PL4 MBVs)
- a. Develops the software in accordance with the approved AES202x PLMS FDS. Functionality shall be based on standard functionality available in the integrated AVEVA Enterprise SCADA PIM Suite, modified to comply with TPL Automation System standards, and shall include the following PLMS real-time functionalities:
 - i. Leak Detection
 - ii. Pig Tracking
 - iii. Theft Detection (Pressure Loss Leak Detection)
 - iv. Batch Tracking.
- 4.3.3.3.2.3 PLMS Development – Software Development - Common
- a. As part of the development,
 - i. The *Employer* may assign one of his engineering resources to be based with the *Contractor's* software development team for the duration of the software development.
 - ii. The *Contractor* hosts a staging area with the required station or simulation facilities to develop, demonstrate and test the full PLMS segment under development.

4.3.3.3.3 PLMS Validation

- b. The Contractor performs the PLMS software validation with a minimum of the following:
 - i. The *Contractor* develops software FAT procedures, and present such to the *Employer* for approval, prior to the FAT. FAT Procedures shall be comprehensive to the degree that minimum site commissioning tests are required. The FAT procedures shall cover system architecture and device/security configurations, complete system functionality, PLMS functionality, alarming functionality, reporting functionality, interfaces.
 - ii. The *Contractor* is responsible for providing simulation to simulate and test all modules of the PLMS (LDS, BTS, PTS and Theft detection).
 - iii. The *Contractor* performs his own iFAT in accordance with the approved FAT procedure, and implements all recorded anomalies. Records of the iFAT activities are made available for inspection by the *Employer*.
 - iv. The FAT shall be performed on the PLMS software which will be deployed to site.
 - v. The *Contractor* invites the *Employer* to the FAT, which the *Employer* performs in accordance with the approved FAT procedures.
 - vi. The *Contractor* implements all recorded anomalies, which are formally approved by the *Employer*.
 - vii. The *Contractor* invites the *Employer* to a hardware/software integration test, which may coincide with the software FAT.

4.3.3.4 PLMS Installation, Commissioning, Tuning:

- a. Procures all hardware and software in accordance with the approved designs.

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- b. Delivers the FAT'd systems and equipment to site (MCC), and performs the site *Works* in accordance with the approved engineering designs and specifications, and quality and safety management procedures.
- c. Performs instrumentation performance assessments in order to ascertain readiness for the PLMS deployment and tuning period to start.
- d. Develops,
 - i. A deployment plan such that the individual segments can be added to the already operational system without adversely affecting existing operation. The plan is to be tested ("Dry-run") before deployment to ensure all aspects have been considered.
 - ii. a PLMS commissioning plan, which includes tuning. As part of the review process with the *Employer*, the *Contractor* participates in a risk assessment/review with the *Employer*.
- e. Deploys the full system, and subsequent incremental updates as per the deployment plan.
- f. Commissions the system in accordance with the approved commissioning plan. The *Employer* participates in the commissioning.
- g. Implements all recorded commissioning anomalies, which are formally approved by the *Employer*.
- h. Performs the PLMS tuning after the *Employer* has corrected instrument performance problems (if any).
- i. Assists the *Employer* in performing Site Acceptance (LMS Performance) tests once tuning has been completed, to ensure compliance with contracted performance specifications [49]. Sensitivity tests are performed on the largest and smallest segment by volume of the Inland network, and is done by simulating leaks of various sizes.

4.3.3.5 PLMS Handover

- a. Handover shall occur for PLMS at the following events,
 - i. Avtur Functionalities
 - ii. Each Inland MP Line segment deployment.
- b. For each event when *Works* have been completed and the line commissioned and handed over to the Employer for beneficial use, the *Contractor* invites the *Employer* to conduct a final site inspection.
- c. On final completion of deployment of the PLMS functionalities,
 - i. The *Employer* inspects all site Works, to ensure that the Works have been completed. This includes:
 - handover of redlined As Built documentation and commissioning records
 - site validation of As Built documentation
 - ii. The *Contractor* corrects all recorded anomalies, which are formally signed off by the *Employer*.
- d. The Contractor, after final completion of PLMS functionalities,
 - i. De-establishes site.
 - ii. Updates all documentation to an as-built status.
 - iii. Hands over the maintenance and commissioning spares to the *Employer*.
 - iv. Hands over, after commissioning as-built documentation updates, the PLMS data pack to the *Employer*.
 - v. The *Contractor* provides an Electrical Certificate of Compliance, and all associated documentation, test certificates etc. to cover all E&I *Works* completed.

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4.4 Employer's Design Review

- a. Upon completion of Execution Phase 2B and Phase 2C , a formal Owners Team design review shall be conducted. At the design review, the Owners Team shall, based on the presented deliverables:
 - Assess if the technical requirements have been complied with;
 - Assess if the technical solution can be practically operated, maintained and adequately supported in the Employers' South African operating and maintenance environment; AND
 - Assess, based on the Contractor's development and execution performance, if the risks associated with the remainder of Works is tolerable; AND
 - Assess if the Contractor has sufficient resources to complete multiple streams during Phase 2.
- b. Failure to comply with any of the above criteria shall constitute a 'no-go' outcome for the solution and the remainder of the Works will not progress to the next Phase.

4.5 Phase 2: PROJECT CLOSEOUT

4.5.1 Phase Objectives

The Phase objectives are:

- a. Completion of PCS/CMS/PLMS System Performance tests at a line-wide level in the MCC, SCC to ensure compliance with contracted performance specifications.
- b. Handover of the complete project data pack (As Built documentation) to the Employer in accordance with the approved Document Handover Matrix [28] and in accordance with requirements listed in [6.5].

4.5.2 Employer Responsibilities

- a. Participates in Automation System performance test activities and verifies the results;
- b. Assists with the review of the complete Project Data Pack as issued jointly by the *Contractor* and *Consultant*.
- c. Takes receipt of the Project Data Pack, Spares and Software Backups.
- d. Certifies that all *Works* have been completed, and issues a Completion Certificate confirming such.

4.5.3 Contractor Responsibilities

- a. Assists the *Employer* in performing Automation System performance tests at a line-wide level within the MCC and SCC, to ensure compliance with the contracted AVEVA Enterprise SCADA PCS System Performance Specification [60]. All anomalies are recorded in a Punchlist Schedule, and categorised in terms of severity. Test results are recorded in an Automation System Performance Test Report and issued to the *Employer*.
- b. Corrects all recorded anomalies, which are formally signed off by the *Employer*.
- c. Issues a complete Project Data Pack to the *Employer* in accordance with the approved Document Handover Matrix [28] and in accordance with requirements listed in [6.5]. This includes:
 - Verified as-built documentation (provided in part by Contractor and Consultant)
 - Complete set of development/built/test history records for software, hardware
 - Software Backups
 - System and Equipment Configuration Procedure and Records
 - System Operating, Maintenance Procedures
 - OEM Equipment Manuals

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- Software Simulator and Test Objects used in the station software development tests and FATs.
- d. Issues all maintenance and commissioning spares to the *Employer*.
- e. Delivers the staging system to the *Employer's* premises in Gauteng.

4.6 Operational Readiness

The *Contractor* shall assist the *Employer's* staff in the change management and skills preparation for the introduction of the new Automation System to the *Employer's* operations.

4.6.1 Operations Training

- a. This shall include:
 - i. Provision of custom developed Operations Manuals for each system.
 - ii. Provision of Operations Train-the-Trainer training course presentation media.
 - iii. Provision of project specific application training courses, related to the operation of the Automation Systems installed on the various Inland stations, as well as at the NOC. The training courses shall be aimed at Trainer and Senior Co-ordinating Officer level, and shall comprise of the following:
 - a. 1 x Trainer course PCS/CMS/PLMS: 2 persons, 3 days
 - b. 3 x Senior Co-ordinating Officer PLMS only: 3 people, 1 day each

4.6.2 Technical Training

- a. This shall include:
 - i. Provision of all Equipment manuals.
 - ii. Provision of all Technical and Maintenance manuals for each system/piece of equipment provided on the contract.
 - iii. Provision of formal standard product technical training courses (OEM), including all required infrastructure and venues, as follows:
 - a. 1 x AVEVA Enterprise SCADA Intermediate Course Workshop to be held in South Africa, to cater for 10 people, and to cover the following courses: AVEVA Enterprise SCADA DNA Essentials, Component Administration, Display Building. (Duration 15 days)
 - b. 1 x AVEVA Enterprise SCADA Advanced Course Workshop to be held in South Africa, to cater for 10 people, and to cover the following courses: Advanced Display Building, Applications Programming, LMS Configuration and Operation, Reporting Services and Generation. (Duration 15 days)
 - iv. Provision for 6 people to attend the Schneider EcoStruxure Control Expert Programming (Software) training course.
 - v. Provision of project specific application technical training courses, including going through System Configuration manuals providing step-by-step instructions enabling rebuilding of system computers, components and interfaces.

4.6.3 Contractor Support Obligations

- a. Whilst the *Employer* will be responsible for first line support of the systems in accordance with the maintenance procedures which are delivered by the *Contractor* as part of the Works, the *Contractor* shall be responsible for providing the following support *Works* for the Automation Systems installed:
 - i. 24/7 call centre support, with remote access to the systems to properly diagnose support requirements;
 - ii. On-site support within 12 hours of a call having been logged.

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- b. The above support shall be available from the time that the first station's commissioning is completed, extending for 12 months after commissioning of the last station. The support contract may be extended and/or modified to suit the operational support requirements.
- c. The *Contractor's* support agreement will not relieve him of his contractual defect correction obligations.

4.6.4 Spares

- a. The *Contractor* shall recommend an appropriate commissioning and maintenance spares strategy for each of the systems for the *Employer*, on the basis of contract quantities and documented MTTF and MTTR statistics.
- b. Spares will be itemised when system architectures and component selection have been finalised.
- c. Opportunities for *Contractor* consignment stock keeping of high cost extended delivery items shall be proposed.
- d. Commissioning Spares shall be procured prior to commencement of the first Inland station commissioning (Phase 2A), and shall be handed over to the *Employer* on completion of commissioning of the last Inland station.
- e. Maintenance Spares shall be procured and issued into the *Employers* stores, on a per station basis and prior to commencement of commissioning.

4.7 Deliverables

Deliverables to be provided by the *Contractor* are listed in Appendix C: Contractor's Deliverables. These deliverables should be read in conjunction with the Detailed Works by Phase [4], and the Activity Schedule.

4.8 Services Provided by the *Employer*

Temporary construction facilities and services within the perimeter of each site:

- Contractor parking for approved vehicles.
- Potable water.
- Temporary power for construction.

A lay down area will be designated at each site for temporary offloading and storage of panels and equipment.

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5. Primary Responsibilities

The specifics of responsibilities of the parties involved are indicated in the following table:

- ♦ R = Responsible (who carries out the activity and is responsible for the outcome)
- ♦ A = Accountable, also Approver (who approves)
- ♦ S = Support (who supports the execution of the activity)
- ♦ C = Consult (who provides advice or information)
- ♦ I = Inform (who should be informed about activity status)

This RASCI table does not override contractual defect rectification responsibilities.

The roles and responsibilities depicted are for all the *Works*, including the *Contractor's* sub-contractor activities.

Table 5-1: Primary Responsibilities

No.	Phase	System/Area	Activity	Employer	Contractor	Comments
1			Project Management	C	R	
1.1	All	Global	Project Management, incl. • Planning and Scheduling • Programme Maintenance and Forecasting • Reporting • <i>Contractor's</i> NEC3 ECC Actions, Responsibilities	C	R	
1.2	All	Global	Quality Management, incl. • Engineering Quality Assurance activities • Software Quality Assurance activities • Procurement Quality Assurance • Panel and Hardware Equipment Quality Assurance	C	R	
1.3	All	Global	Safety Management	C	R	
1.4	All	Global	Review and Accept Project, Quality, Safety Management Deliverables and Activities	R	S	
2			System Development	A	R	
2.1	Phase 1	PCS/CMS/PLMS	Global PCS/CMS/PLMS Requirements Clarification and Design	A,C	R	
2.2	Phase 1	PCS/CMS/PLMS	Global PCS/CMS/PLMS System Design	A,C	R	Agile, with <i>Employer</i> consultation and Thin-slice evaluations and demonstrations
2.3	Phase 1	PCS/CMS/PLMS	Global PCS/CMS/PLMS Software Standards Development	A,C	R	Agile, with <i>Employer</i> consultation and Thin-slice evaluations and demonstrations

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No.	Phase	System/Area	Activity	Employer	Contractor	Comments
3			Station Engineering and Execution			
3.1	Phase 2	PCS/CMS/PLMS	Station PCS/CMS/PLMS Engineering	A,C,S	R	<i>Employer</i> supports design by providing site information, loop, panel designs
3.2	Phase 2	MCC PCS/CMS/PLMS	MCC PCS/CMS/PLMS Engineering	A,C,S	R	<i>Employer</i> supports design by providing site information, panel designs
3.3	Phase 2	SIS	Station SIS Engineering	R	S,C	<i>Employer</i> designs SIS loops, whilst <i>Contractor</i> integrates SIS Trip Amplifiers into PCS panels
3.4	Phase 2	PCS, CMS, Stations	Station Field Engineering	A,R	C,S	<i>Employer</i> designs field loops to panel IO terminals. <i>Contractor</i> provides design inputs e.g. panel designs, IO assignments, equipment certificates for IS certification, safety manuals
3.5	Phase 2	HMI Training System	HMI Training System Design	A,C	R	
3.6	Phase 2	PCS, CMS, SIS, MCC, Training System, Stations	Procurement, Fabrication and Testing	A,C	R	
3.7	Phase 2	PCS, CMS, MCC, Training System, Stations	Software Design	A,C,S	R	<i>Employer</i> consultation and Thin-slice evaluations and demonstrations <i>Employer</i> supports design by providing EDS.
3.8	Phase 2	PCS, CMS, MCC, Training System, Stations	Software Design - EDS	R	S	<i>Employer</i> develops software EDS, <i>Contractor</i> provides design inputs. <i>Contractor</i> updates EDS during software development.
3.9	Phase 2	PCS, CMS, SIS MCC, Training System, Stations	Hardware/Software System Integration Testing	A,C	R	
3.10	Phase 2	PCS, CMS, SIS, MCC, Training System, Stations	System Installation	A,C	R	Multicore instrument and electrical cables will be re-used, i.e. swung over from existing to new PCS/CMS panels.
3.11	Phase 2	CMS	Reconfiguring and configuring of Floboss S600+ Flow Computers	R	S	Reconfiguration to ensure compatibility with proposed CMS solution.
3.12	Phase 2	PCS, CMS, SIS, MCC, Stations	E&I Field Systems Installation	A,C,S	R	Field E&I design by <i>Employer</i>

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No.	Phase	System/Area	Activity	Employer	Contractor	Comments
3.13	Phase 2	PCS	Progressive decommissioning of existing PCS Systems	R, S	I	
3.14	Phase 2	All obsolete equipment	Removal and disposal of all obsolete equipment	A,C,S	R	Refer section 9.
3.15	Phase 2	PCS, CMS, SIS, MCC, Training System, Stations	System Commissioning	A,C,S	R	<i>Employer</i> witnesses and supports commissioning
3.16	Phase 2	PCS, CMS, SIS, MCC, Training System, Stations	System Handover	A,I	R	
4			PLMS Engineering and Execution			
4.1	Phase 2	PLMS	Procurement, Fabrication and Testing	A,C	R	
4.2	Phase 2	PLMS	PLMS System Design	A,C	R	Agile, with <i>Employer</i> consultation and Thin-slice evaluations and demonstrations
4.3	Phase 2	PLMS	PLMS Software Standards Development	A,C	R	Agile, with <i>Employer</i> consultation and Thin-slice evaluations and demonstrations
4.4	Phase 2	PLMS	PLMS Software Design	A,C,S	R	Agile, with <i>Employer</i> consultation and Thin-slice evaluations and demonstrations.
4.5	Phase 2	PLMS	PLMS Hardware/Software System Integration Testing	A,C	R	
4.6	Phase 2	PLMS	PLMS Operations & Maintenance Training	A,C,S	R	
4.7	Phase 2	PLMS	PLMS System Installation	A,C	R	
4.8	Phase 2	PLMS	System Commissioning	A,C,S	R	<i>Employer</i> witnesses and supports commissioning
4.9	Phase 2	PLMS	Tuning	A,I	R	
4.10	Phase 2	PLMS	System Handover	A,I	R	
5			Training and Operations Readiness			
5.1	Phase 2	PCS, CMS, PLMS	PCS/CMS/PLMS Operations & Maintenance Documentation and Training	A,C,S	R	

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No.	Phase	System/Area	Activity	Employer	Contractor	Comments
5.2	Phase 2	PCS, CMS, PLMS	PCS/CMS/PLMS supplementing of existing operating procedures to suit new systems.	A,C,S	R	
6			Installation and Construction Management			
6.1	Phase 2	PCS, CMS, MCC, Training System, Stations	Coordination of Site Installation	A,S	R	
6.2	Phase 2	PCS, CMS, MCC, Training System, Stations	Supervision of Site Installation	A	R	
6.3	Phase 2	PCS, CMS, MCC, Training System, Stations	Provision of Site Construction Facilities for Construction Team	I	R	
6.4	Phase 2	PCS, CMS, MCC, Training System, Stations	Provision of Security Services	I	R	
6.5	Phase 2	PCS, CMS, MCC, Training System, Stations	Provision of Safety Officer	A	R	
6.6	Phase 2	PCS, CMS, MCC, Training System, Stations	Prepare Safety Plan	A	R	
6.7	Phase 2	PCS, CMS, MCC, Training System, Stations	Medical and First Aid	I	R	
6.8	Phase 2	PCS, CMS, MCC, Training System, Stations	Provision of Fire Protection Services	R	I	
7			Project Closeout			
7.1	Phase 2	PCS, CMS, MCC, Training System, Stations	Update all Design documentation to "As-built"	A	R	
7.2	Phase 2	PCS, CMS, MCC, Training System, Stations	Prepare packs per site and issue	A	R	

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6. Role of the *Contractor* within the Project Context

6.1 Role of the *Contractor* within the Project Context

The *Contractor* is responsible for the execution of all of the *Works* associated with the Project, quality assurance of the *Works* and any other services in connection with the carrying out of the *Works* as specified in this document and other supporting documents.

6.2 *Contractor* Experience Requirements

The *Contractor* shall have extensive proven experience in the following fields of expertise in order to provide support to the technical development of the systems, sub systems, elements and components associated with the *Works*:

- a. Have a sound proven knowledge of multi-product and single product Petroleum Pipeline operations.
- b. Have extensive knowledge and proven experience in the design, configuration, software development, testing and deployment of the Automation System to be deployed to all Inland Stations as part of these *Works*. This shall include amongst others, software configuration, communication networks, telecontrol protocols, SCADA graphics, databases, historian/ replay servers and Workstations associated with the following:
 - AVEVA OASyS DNA SCADA interfaced to Schneider m580 PLCs for control and monitoring, interfaced to Emerson S600+ Flow Computers for custody metering, and PIMTM for pipeline monitoring
 - AVEVA Enterprise SCADA interfaced to Schneider m580 PLCs for control and monitoring, interfaced to Emerson S600+ Flow Computers for custody metering, and PIM™ for pipeline monitoring.

It is a requirement that the *Contractor* demonstrates both proven experience and competency in the design, configuration, software development, testing and deployment of these systems in a petroleum pipeline environment. Experience and competency will be assessed on the following criteria:

- Completion of two (2) or more projects related to the development and deployment of process control systems within a petrochemical environment; with at least one project value greater than or equal to R 50 mil.
 - Completion of 1 or more projects related to the development and deployment of either of the systems (Aveva OASyS DNA or AVEVA Enterprise SCADA) into a petroleum pipeline environment, each project of value greater than or equal to R 50 mil;
 - Key personnel appointed to this project complying with the requirements listed in section 6.3 below.
- c. Have extensive knowledge and proven experience with custody transfer metering systems as used on Petroleum Pipelines.

Emerson S600+ Flow Computers are currently used by Transnet Pipelines for custody metering applications. It is a requirement that the *Contractor* demonstrates both proven experience and competency in the design, configuration, software development, testing and deployment of these systems in a petroleum pipeline environment.

- d. Have extensive knowledge and proven experience with pipeline monitoring systems and in particular the following pipeline monitoring systems:
 - PIM™ Leak Detection, Batch Tracking, Pig Tracking and other RTA's which are integrated into the Automation System to be installed as part of these *Works*.

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It is a requirement that the *Contractor* demonstrates proven experience and competency in the design, hardware and software configuration of these systems in a petroleum pipeline environment, as well as their OPC interfaces.

- e. Have an adequate number of experienced, competent and qualified resources to complete the *Works* using multiple work streams, in accordance with the Key Dates and Project Execution Plan proposed. In this regard, the Contractor shall provide a minimum of two teams dedicated to working concurrently on PCS/CMS software (SCADA and PLC) development, as well as a third team dedicated to PLMS software development.

The *Contractor* shall submit a Project Organisation Chart depicting the proposed staff allocation to the project. The chart shall also identify the Key Personnel/Employee's supported by CV's demonstrating the proven experience requirements listed below.

6.3 Contractor Key Project Resources

The following roles have been identified as *Key Resources* for the project.

The *Contractor* shall submit CVs with the RFP response, detailing experience and qualifications of each resource as listed below.

6.3.1 Project Manager

The Project Manager shall have at least,

- 5 years' of industrial project coordination experience.
- Experience managing complex software projects.
- Experience managing international project teams.
- Experience in large project execution (>R150m).
- Holds a technical qualification (Diploma, BTech, degree) in any engineering field, with a project management certificate or diploma.

6.3.2 Engineering Manager

The Engineering Manager shall have at least,

- 5 years' of petrochemical experience in a project development environment.
- Experience managing international software development teams.
- Experience managing multi-system integration.
- Holds any technical qualification (Diploma, BTech, degree) or equivalent qualification within the control and instrumentation field.

6.3.3 Senior Control Engineer – SCADA (OASyS DNA/AVEVA Enterprise SCADA)

Two Senior Control Engineers – SCADA shall be provided, to lead two Automation System development teams in developing software concurrently.

The Senior Control Engineers shall have at least,

- 3 years' experience in the design, configuration, software development, testing and deployment of either AVEVA OASyS DNA or AVEVA Enterprise SCADA Systems, including the Liquid Management Suite (LMS) applications, into a petroleum pipeline environment. This shall include amongst others, software configuration, communication networks, telecontrol protocols, SCADA graphics, databases, historian/ replay servers and Workstations.

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- Completed the relevant intermediate, and advanced level process control system specialist courses (OEM certified) for either AVEVA OASyS DNA or AVEVA Enterprise SCADA Systems. Relevant courses include the following:
 - Component Administration, Applications Programming, Display Building, Advanced Display Building, Reporting Services and Generation, LMS Configuration and Operations, Application Programming, OR
 - Completed the CSI OASyS DNA exam.

6.3.4 Senior Control Engineer – PLC

Two Senior Control Engineers – PLC shall be provided, to lead two Automation System development teams in developing software concurrently.

The Senior Control Engineer shall have at least,

- 3 years' experience in the design, configuration, software development, testing and deployment of Schneider m580 PLC Systems into a petrochemical environment.
- Completed relevant OEM certified PLC training courses. Relevant courses include the following:
 - Schneider courses: EcoStruxure Control Expert Programming.

6.3.5 Senior Control Engineer – PLMS

The Senior Control Engineer shall have at least,

- 3 years' experience in the design, configuration, software development, testing and deployment of AVEVA Pipeline Integrity Monitor (PIM) / SimSuite Software (Leak Detection applications only) into a petroleum pipeline environment. This shall include amongst others, PLMS software configuration, tuning and commissioning.
- Completed relevant OEM certified AVEVA PIM training courses. Relevant courses include the following aspect of PIM:
 - Leak Detection,
 - Batch Tracking,
 - Theft Detection, and
 - Pig Tracking.

6.3.6 Senior Systems Engineer

The Senior Systems Engineer shall have at least,

- 3 years' experience in the design, configuration, setup, testing and deployment of Process Control System hardware and communication networks in a Microsoft Windows environment, including the following: virtual machines, servers, workstations, domain controllers, printers, WSUS, firewalls, network switches etc.
- Holds a Microsoft Certified Systems Engineering qualification.

6.4 Substitution of Key Personnel

No substitution of any "Key Personnel/Employees" essential for the successful completion of the project and identified in the Project Organisational Chart will be allowed by Transnet Pipelines in terms of this Contract, without prior written approval.

Before any "Key Personnel/Employee" substitution can take place, the *Contractor* shall submit a written request to the *Employers* Agent and this substitution request shall include the following:

- Detailed written justification.

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- The qualifications and experience of any proposed “Key Personnel/Employee” replacement.
- A written statement assuring the *Employer* that the project scope of work will not be adversely affected by this substitution.

6.5 Documentation Control

The *Contractor's* documentation shall comply with the *Employer's* standards and requirements. The *Employer* will issue all relevant documentation to the *Contractor*, but control, maintenance and handling of these documents will be the *Contractor's* sole responsibility, at the *Contractor's* expense, and managed with a suitable document control system. At agreed periods throughout the development of the project the *Contractor* will be required to transfer/migrate documentation to the *Employer's* document management system. The format of these documents shall be agreed up front and shall be fully usable and in native & PDF format. All the relevant links and supporting documents shall be provided.

6.5.1 Document Format

- The *Contractor* shall issue documentation to the *Employer* in native format such that it is able to be edited and used by the *Employer* in its original form.
- The *Contractor* shall ensure that documentation issued to the *Employer* is of good quality, and terms used and layouts of documentation shall be kept consistent throughout the project.
- Documents issued by the *Contractor* as part of a review cycle shall have clear evidence of any comments received on the document and the disposition thereof in a comments resolution table.
- Documentation and drawing standards shall comply to TPL specifications [8], [9], [10] and [11].

6.5.2 Final Documentation

- The *Contractor* shall provide as a minimum the following number of copies of Final Documentation (As-Built). Documentation shall be both in native format such that it is able to be edited and used by the *Employer* in its original form, as well as in pdf format.
 - Drawing Office – one full (MASTER) set in soft format (CD, DVD, Hard Drive)
 - TPL Library – one full (MASTER) set in paper format
 - MC&I Workshop – one full set in both soft format (CD, DVD, Hard Drive), and paper format
 - Depot – one full set in both soft format (CD, DVD, Hard Drive), and paper format
 - Project Manager and those designated - one full set in soft format (CD, DVD, HardDrive)
- Before being submitted to Transnet Pipelines, all Final Contract Documentation and in particular AS BUILT Drawings shall be examined for compliance with onsite detail by the *Contractor* and signed as such.
- All documentation (inclusive of hard copies and software) shall be supplied with a comprehensive Indexing system, to enable ease of access to drawing files. This index shall include as a minimum, the file names, drawing title, brief description, Contractor's/consultant's name and Drawing number, pipeline name etc.
- Final Documentation shall be submitted to the *Employer* within eight weeks of the Contract completion date.

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6.5.3 **Works Documentation and Software Retention**

- Contractor* shall retain electronic backups of *Works* documentation and software for a period not less than five (5) years after completion of the *Works*.
- Contractor* shall present the *Employer* with a disaster recovery plan at the start of the *Works*, and retain the backups in accordance with the plan.

6.6 **ICT**

- The *Contractor* shall provide and have available computing, server, back-up, communications, software's and licencing in order to successfully interface with the *Employer's* tools and systems.
- Should the *Contractor* access the *Employer's* Information Assets; they will use these in a manner that will not harm or endanger Transnet as a company in line with the *Employer's* Information Security Policy and any other related policies.
- The *Contractor* shall sign the confidentiality agreement to adhere to the *Employer's* Information Security Policy and all other relevant Transnet's Policies
- The software used shall similarly be conversant with the *Employer's* approved software in order to meet the obligation of this Works Information.
- The *Contractor* shall make available connectivity, internet access, ICT infrastructure and applications access, document control access and any other systems used by the *Contractor* shall be made available to the *Employer* at any point in time during the project
- The *Contractor* shall ensure that all data stored on the Workstations is backed up to the secure server provided by the *Contractor*. It is the responsibility of user of the desktop, laptop, handheld mobile devices to ensure that business information and data stored on these devices is backed up.

6.7 **Applicable Legislation**

The *Contractor* shall comply with South African legislation and statutory requirements. Applicable legislation includes but is not limited to:

- The Occupational Health and Safety Act of South Africa (OHSA) (Act 85 of 1993).
- Construction Regulations contained in Government Gazette No. 37305, Notice No. 10113, dated 07 February 2014, as applicable, and ensures that notices and other documents required in terms of the said Construction Regulations are copied timeously to the *Project Manager*.
- The Minerals Act and Regulations (Act 50 of 1991 as amended).
- The Atmospheric Pollution Prevention Act of South Africa (Act 45 of 1965).
- The Water Services Act (Act 108 of 1997).
- National Water Act (Act 36 of 1998).
- The Hazardous Substances Act of South Africa (Act 15 of 1973 as amended).
- National Building Regulations and Building Standards Act (Act 103 of 1977).
- Environmental Conservation Act of South Africa (Act 73 of 1989).
- Mineral and Petroleum Resources Development Act (Act 28 of 2002).
- National Environmental Management Act (Act 107 of 1998).
- National Environmental Air Quality Amendment Act (Act 39/04).
- The Copyright Act (Act 98 of 1978)
- Local laws and regulations, and
- RSA Act No. 9 of 2014: Legal Metrology Act.

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The *Contractor* shall involve the *Employer's* Legal department for any legal matter as detailed in the legal policy and any other legal matter associated to the *Contractor's* scope of services, this shall include all notified disputes.

6.8 Quality Assurance Requirements

- a. The onus rests on the *Contractor* to produce work which conforms to the quality requirements stated in the contract. The *Contractor* must, at his own expense, institute a quality control system and provide experienced technical staff together with all transport, instruments and equipment to ensure adequate supervision and positive control of the Works at all times.
- b. The *Contractor* shall review and accept (where they have authority to do so) quality documentation provided by other Contractors contracted with Transnet SOC.
- c. The *Contractor* and delegated Project Managers shall report on the *Contractor's* quality assurance processes, making specific reference to compliance, deviation, risk identification, mitigation proposals and actions.
- d. It is recorded that material provided by the *Employer* to the *Contractor* for the services may include designs done by others. The *Contractor* shall obtain approval from the *Employers Agent* before any design reviews or checks are undertaken.
- e. Where material is "Free-issued" the *Contractor* shall undertake normal quality review process as if the material was not "free-issued", unless otherwise instructed by the *Employers Agent*. The *Contractor* shall report to the *Employer* any concerns he may have with the material for the *Employer's* decision.
- f. The *Contractor* shall guarantee that:
 - i. The Contractor and any 3rd party Contractor supplies appropriate and suitable skills to execute the Works in accordance with this Works Information,
 - ii. The Works strictly complies with the provisions of the contract and all specifications and drawings referred to in the Works Information or afterwards, as furnished by the Employer / Employers Agent,
 - iii. The Works is first class in every particular detail and free from Defects in construction and workmanship and in any design and engineering furnished by the Contractor,
 - iv. All design and engineering supervision that forms part of the Works is performed in accordance with sound engineering practice and standards of skill and care practiced by recognised engineering firms in performing similar work,
- g. The *Contractor* shall ensure that:
 - i. The Contractor performs all quality related activities as specified in ISO 9001:2008 "Quality Management System", or equivalent, acceptable to the Employer.
 - ii. The Contractor provides the necessary quality management systems to ensure that the quality of the Works complies with the requirements of the Works Information.
 - iii. The Employer reserves the right to review certified material test reports for all materials of construction at any time during field erection. The Contractor maintains these documents readily available for such review and submits all documents to the Employer on completion of the Works.
 - iv. The Contractor's performance of his obligations under the Contract is not deemed complete until the Employers Agent is in receipt, on proper forms, of all Technical Data and other documents to be submitted to the Employers Agent as part of the Contractor's work. Failure of the Contractor's to comply with the Quality requirements entitles the Employer to withhold any progress payment, or final payment, pending the Employers Agent receipt of all the above data without prejudice to any other remedy of the Employer.

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- v. All Plant and Material supplied are new, merchantable, of the most suitable grade and fit for their intended purposes,
- vi. All materials proposed by a Contractor for incorporation into the Works are tested in accordance with the required specification. All test results are submitted to the Employers Agent for approval prior to such materials being built into the Works. No material is built into the Works without such approval.
- vii. The Contractor provides and maintains sufficient Equipment to meet all contractual requirements and does not remove any of this Equipment from the site without the written permission of the Employers Agent. The Contractor removes unsuitable, obsolete or worn-out Equipment from the site when ordered to do so by the Employers Agent.
- viii. All Equipment which is used on the site is in first class operating condition, safe, fit for its intended use and suitable for safe and efficient performance of the Works.
- h. The *Contractor* shall submit:
 - i. A comprehensive Project Quality Plan (PQP) for review and approval by the Employer.
 - ii. The PQP is specifically tailored to the requirements of the Works, and covers the full scope, including software development as well as:
 - a. Detail the *Contractor's* organisation indicating how the project will be staffed,
 - b. Detail the interface with the *Contractor's* Quality Management System and applicable documents, procedures and work instructions,
 - c. Detail the *Contractor's* design review and verification requirements for the *Works*,
 - d. Detail the *Contractor's* inspection requirements for the *Works*, including all Factory and Site Tests and other special processes, hold points, witness and observation points, material control and traceability, cleaning and preservation, material storage and transport,
 - e. Detail quality controlling procedures,
 - f. Detail specific acceptance criteria, showing specific codes, standards and specification references, and definition of achievable tolerances,
 - g. List major *Contractors* and subcontractors, including their quality program and level of supplier source inspection of sub-ordered material. The *Contractor* shall ensure that approved Subcontractors are capable of performing the required work / service,
 - h. Identify inspection documentation used for the recording of inspection functions, special processes, non-conformance release and acceptance reports, and qualification of inspection / test personnel; and
 - i. Contain an inspection schedule plan, showing level of inspection or surveillance.
- i. The *Contractor* shall submit a software development lifecycle (SLCP) plan for approval by the *Employers* Agent. The plan shall be based on IEEE/EIA 12207.0 Standard for Information Technology Software lifecycle processes with specific tailoring for the *Works*. The SLCP covers, as a minimum, all the software *Works* from the Development Phase onwards.
- j. The *Contractor* shall formally submit a Software Configuration Management Plan (SCMP) for review and approval by the *Employers* Agent. The *Contractor* shall monitor adherence to the SCMP for the configuration of all the *Works* systems and software. To this end the

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Contractor shall designate a competent software development engineer to monitor the *Contractors* approved quality and SLCP program to ensure compliance with all the requirements of the *Works*.

- k. The *Contractor* shall request inspections of the *Works* by the *Employer* or governmental agencies only after that portion of the *Works* is ready for inspection.
- l. The *Contractor* shall ensure that:
 - i. All hardware, software and equipment is subject to Factory Acceptance Testing (FAT) prior to delivery to site.
 - ii. All inspections and tests shall be supported by inspection or test procedures prior to the inspections and tests taking place.
- m. Quality Control Plans (QCP) developed for each contract are to be managed by the *Contractor*. The QCP's are to:
 - Be consistent with the approved SLCP and PQP,
 - Identify all the tasks / steps pertaining to the *Works* section,
 - Identify the quality control points pertaining to the *Works*,
 - Identify the quality control controlling procedures and documents; and
 - Identify the roles and responsibilities of the *Contractor* and 3rd party *Contractor* insofar as the quality control hold points,
- n. The *Contractor* shall monitor the quality management system and shall audit any of the above systems throughout the life cycle of the project.
- o. The *Contractor* shall ensure unrestricted access to all parts of the *Contractor's*, or their Sub-contractor's work by the *Employer* or other inspection bodies, as may be appointed by the *Employer* or *Contractor*.

6.9 Risk Management.

- a. It is the *Contractor's* obligation to proactively manage and mitigate against all risk.
- b. Where suitable, the *Employers* Agent and the *Contractor* shall discuss which risks are best managed by whom and necessary delegations shall be provided to ensure that party has authority to manage accordingly.
- c. The *Contractor* shall be transparent and open in the approach to risk management with the *Employer*.
- d. An adequate escalation/engagement procedure shall be proposed by the *Contractor* to ensure the severity of the risk is addressed in the right time frame by the right person.
- e. The *Contractor* may use their own Project Risk Management templates provided that they are approved for use by the *Employer*.

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7. Work, Safety and Health

7.1 General

- a. The *Contractor* and its sub-contractors shall comply with the requirements as stated in this *Works* Information and attachments hereto.
- b. The *Employer* maintains high standards in safety and the *Contractor* undertakes not to jeopardise these standards.
- c. The *Contractor* and its sub-contractors who provide the *Works* on the Site shall, at all times work safely, and comply strictly with governmental, provincial, municipal and local laws, ordinances, regulations, by-laws and acts of parliament pertaining to health or safety which are applicable to the *Contractor* and Sub-contractors or to the *Works* including without limitation the OHS Act, as amended, and regulations there under, and the *Contractor* warrants that the work complies therewith.
- d. The *Contractor* provides proof to the *Project Manager* that the *Contractor*, and its Sub-contractors procured by the *Contractor* to provide the Works at the Site, comply with the requirements of the COID Act 130 of 1993. The *Contractor* and Sub-contractors provide their compensation registration numbers to the *Project Manager*, prior to the possession date, to be available for scrutiny by the *Employer* upon request.
- e. The Occupational Health and Safety Act No 85 of 1993 and the regulations promulgated in terms of the Act, as amended, are the Act governing the Site. Specific attention is drawn to the requirements of the Construction Regulations as promulgated in 2003. The *Contractor* and Sub-contractor shall comply with the legal requirements of the said Act whilst working on the Site. This agreement serves to exclude the presumption in Section 37(1) of the Occupational Health and Safety Act and serves to meet the requirements of Section 37(2) of the Act. Proof of the appointments made by the *Contractor* and Sub-contractors in accordance with the Act are available at the Site at all times while the *Contractor* is providing the Works; for inspection by any representative of the *Employer*.
- f. With regard to Section 37(2) of the OHS Act, the *Contractor* hereby acknowledges that it is an *Employer* in its own right with duties as prescribed in the OHS Act, and the *Contractor* hereby ensures that work is performed and machinery and equipment used in accordance with the provisions of the OHS Act. The *Contractor* hereby agrees to advise the *Employer* promptly if it is unable to comply with the foregoing undertaking at any time for whatever reason.
- g. The *Contractor* and its Sub-contractors providing the *Works* comply with the Construction Regulations 3 of the OHS Act: "Notification of Construction Work". The details of the notice are delivered to the Control Inspector, Department of Labour, in writing on official stationery of the organization and a copy is submitted to the *Project Manager*.
- h. The *Contractor* and its Sub-contractors providing the *Works* within the boundaries of the site comply at all times with the instructions and requirements of the applicable *Employer* codes and procedures. The *Employer's* codes and procedures are available upon request.
- i. The *Contractor* familiarises himself with the *Employer's* codes and procedures and assures compliance thereto by its employees. The *Contractor* ensures that it is in possession of the latest editions of the applicable codes at all times. If any requirements of the codes are in conflict with the requirements of the Occupational Health and Safety Act of 1993, as amended, compliance to the said Act takes precedence.
- j. The *Contractor* and its Sub-contractors providing the *Works* conduct a risk assessment performed by a competent person before providing the *Works* at the Site. The risk assessment forms part of the health and safety program applied in the Site by the *Project Manager*. The risk assessment includes as a minimum:

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- The identification of the risks and hazards to which an individual's health and safety may be exposed.
 - The analysis and evaluation of the hazards identified;
 - A documented plan and safe work procedures to mitigate, reduce or control the risks identified; and
 - A monitoring and review plan of the risks and hazards.
- k. The *Contractor* and its Sub-contractors providing the *Works* ensure that a copy of the hazard identification and risk assessment is available at the Site for inspection by an inspector. A duplicate copy is available for the *Employer*, any employee, any organisation, health and safety representative or member of the health and safety committee.
- l. The *Contractor* and its Sub-contractors providing the *Works* submits and demonstrates to the *Employer*, before Providing the Works, a documented health and safety plan, based on the *Employer's* health and safety specification provided. The health and safety plan is applied from the starting date until the end of the Defect correction period. A copy of such programme is available on request from the *Contractor*.
- m. The *Employer* has the right to stop work whenever safety violations are observed which could jeopardize the wellbeing of personnel and equipment. The expense of any such work stoppage and resultant standby time are for the *Contractor's* account. The failure or refusal of the *Contractor* to correct the observed violation may result in the termination of the Contract, and/or the dismissal from the Site of those responsible for such failure or refusal.
- n. The *Employer* may inspect the *Contractor's* Equipment, Plant and Materials and the *Contractor* satisfies himself that his Equipment, Plant and Materials are safe to use before commencement and during the *works*.
- o. The *Contractor* undertakes to replace any Equipment, Plant and Materials which, are in the *Employer's* opinion unsafe to use, and the *Employer* may stop work in which the unsafe item is being used. The *Contractor* undertakes to have hard hats, hand gloves, safety shoes, long-sleeved overalls and any other safety apparel and devices as the specific areas or tasks require whilst working in the Working Areas.
- p. To preserve the high safety standards, the *Contractor* undertakes to:
- i. Successfully undergo safety induction training regarding the Employer's safety requirements of the specific Working Areas (the duration of the training depends on the area and the specific requirements, but generally requires two hours).
 - ii. Undergo training in the Employer's Work Permit system (generally requires 2 hours).
 - iii. Attends training for the entry into confined spaces – if required to work in such areas; and
 - iv. The Contractor, its Supervisors ie. persons appointed and/or responsible in terms of the OHS Act and its personnel are subject to, and successfully undergo training regarding safety requirements of specific areas. The duration of the training depends on the area and the specific requirements, but generally requires 2 (two) hours.
- q. The *Contractor* provides identification badges to its employees working either directly or indirectly under its supervision. These badges are worn conspicuously by these employees at all times when on the jobsite.
- r. No smoking allowed in the work area(s) or outside of the designated smoking area.

7.2 Safety Requirements

- a. The *Contractor* and its Sub-contractors have in effect a safety plan and a designated Safety Representative.

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- b. The *Contractor's* Safety Representative is responsible for initiating the safety program, ensures that jobsite safety requirements and procedures are accomplished, conducts safety inspections of the *works* being performed, conducts weekly safety meetings with craft employees and submits weekly reports to the *Project Manager* documenting safety activities. The Safety Representative is responsible for a continuing survey of its operations, to ensure that the probable causes of injury or accident are controlled and that operating equipment, tools and facilities are used, inspected and maintained as required by applicable safety and health regulations.
- c. The *Contractor* demonstrates to the satisfaction of the *Project Manager* that wire ropes, chains, slings and accessories used, are adequately rated for the required task prior to the use thereof.
- d. The *Contractor* organizes and conducts weekly gang box safety meetings attended by all of the *Contractor's* craft employees.
- e. The *Contractor* provides to the *Project Manager* a copy of reports made to government agencies or insurance companies relating to any jobsite accident or injury during the *Contractor's* performance of the *works*.
- f. The *Contractor* satisfies the *Employer* that:
 - i. The Contractor complies with the OHS Act regarding legal appointments required, by submitting certified copies of such appointments on demand; and
 - ii. The Contractors people executing the Works are trained and experienced in the work to the extent that they are competent to do it safely. The *Contractor* submits written proof of the training and experience of any of his people after being requested to do so by the *Employer*.
- g. The *Contractor* complies with and adheres to the *Employer's* health and safety rules attached in,
 - i. the *Employer's* Contract Management Procedure [6], and
 - ii. the *Employer's* Contractor Compliance File Assessment Checklist [7].
- h. The *Contractor* ensures that the *Works* are performed in full compliance with the *Contractor's* Waste Management Plan, Site Safety Plan and Emergency Response Plan.

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8. Environmental Management

8.1 Environmental and Sustainability Management

The *Contractor* shall have required environmental expertise and experience to manage all environmental and sustainability planning requirements during the EXECUTION stage.

Key areas of environmental and sustainability focus include:

- Recycling of electronic components, wiring and cabling.
- Re-use of computer equipment (where practical).
- Re-use, re-cycling and/or disposal of panel steelwork.

Environmental Management will be coordinated against TPL environmental policy and standard specification listed as references 5 and 6 in Table 8-1.

Table 8-1: Environmental Management Standards and References

No.	Document Number	Document Title
1.	ISO 14001:2015	Environmental Management Systems – Requirements with Guidance For Use
2.	ISO 14004:2010	Environmental Management Systems – General Guidelines on Principles, Systems and Support Techniques
3.	ISO 14004:2016	Environmental Management Systems – General Guidelines on Implementation
4.	ISO 19011:2011	Guidelines for Auditing Management Systems
5.	ENV-POL-001 rev.0	TPL Environmental Policy (2012)
6.	ENV-SOP-004 rev.0	TPL Standard Environmental Specification (2013)
7.	EM-M-001 rev.2	Hatch Environmental Management System Manual

Disposal of obsolete and redundant material shall comply with the regulations listed in Table 8-2, in particular in the categorisation of waste material as either:

- Category A: Hazardous Waste - 14(b), hazardous portion of wastes from electrical and electronic equipment.
- Category B: General Waste - 8(b), wastes from electrical and electronic equipment not otherwise specified in Category A.

Collection and disposal of waste material shall be done by duly authorised and licensed service providers, as detailed in NEMWA.

Table 8-2: Disposal Regulations

Regulation	Description
NEMWA	National Environmental Management: Waste Act 59 of 2008
Gazette No.: 37083 Notice Number: 921	List of Waste Management Activities that have, or are likely to have, a detrimental effect on the environment, published under Government Notice 718 in Government Gazette 32368 of 3 July 2009, in terms of section 19(2) of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)

8.2 Hardware Disposal

Responsibility for the disposal of system and equipment hardware is detailed below:

Table 8-3: Hardware Disposal Responsibility

Hardware	Responsibility	Scope
Panel Steelwork, wiring and cabling	E&I Contractor/ Panel Manufacturer	Removal from site for re-use or to a registered scrap metal merchant, after removal of electronic and electrical components.
Electronic Components	Panel Manufacturer	Components to be assessed for re-usability in the following areas and priority: - Relocation to TPL spares warehouse as spares for other sites – TPL to verify whether components can be re-used. - Removal to a registered electronic materials recycling facility.
Electrical Components	Panel Manufacturer	Components to be assessed for re-usability in the following areas and priority: - Relocation to TPL spares warehouse as spares – TPL to verify whether equipment can be re-used. - Removal to a registered electrical equipment recycling facility.
Computer Equipment	System Vendor	Computers to be assessed for re-usability in the following areas and priority: - Relocation to TPL spares warehouse as spares for the Inland Network Automation PCS – TPL to verify whether equipment can be re-used or kept as a strategic spare. - Computer equipment suitability for tuition and skills development – as the equipment is generally Unix based and obsolete, it is unlikely that this will be practical. - Removal to a registered electronic materials recycling facility.

8.3 Fabrication Activities

Where practical, existing control panels, chassis plates and cabinets shall be assessed for in-situ refurbishment and re-use as an alternative to scrapping.

8.4 Construction/Commissioning Activities

Appropriate risk assessments shall be conducted to ensure safe installation, testing and commissioning activities, with the specific objective of containing construction waste and preventing product spillage.

9. Document Lifecycle Management

9.1 Revision History

The owner of this document is responsible for the revision and control of the document, including updating of the table below, which contains the history of the document with details of each revision.

Date	Previous Rev No.	New Rev No.	Details of Revision
2024-03-15	-	A	Issued for Review
2024-04-01	A	B	Issued for Client Review
2024-04-02	B	0	Issued for Use
2024-06-08	0	0A	Updated with comments
2024-07-05	0A	0B	Issued for Use

This table summarises what has been changed in the document so that it is easy to keep track of the effected changes.

9.2 Comments Resolution

Date	Section	Comment	Resolution

This table lists comments and the basis of resolution to keep track of decision outcomes and reasoning.

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Appendix A: Project Execution Receivables

Documentation listed below will be provided to support the execution of the *Works*.

Documentation marked as being provided with the RFP has been issued for reference to inform assessment of the scope of execution of the *Works*.

The *Works* shall comply with the following requirements:

Table A-1: TPL Standards and Specifications (Global and OASyS DNA 2018 As Is)

No.	System/Area	Document	Document No.	Rev.	Timing
1	Global	TPL Standards & Specifications			
1.1	PCS	Process Control System User Requirements Specification	TPL-TECH-I-C-SPEC-012	03	With RFP and Post Contract award
1.2	CMS	Custody Metering System User Requirements Specification (Integrated)	TPL-TECH-I-M-SPEC-011B	04	With RFP and Post Contract award
1.3	HMI Trainer	HMI Trainer User Requirements Specification	H354086-00000-270-078-0002	0	With RFP and Post Contract award
1.4	PCS	Control System Replay User Requirements Specification	H354086-00000-270-078-0003	0	With RFP and Post Contract award
1.5	PLMS	Inland PLMS User Requirements Specification	H373204-PLMS-270-242-0001	0	With RFP and Post Contract award
1.6	Project-wide	Contractor Management Procedure	TRN-IMS-GRP-PROC-014	2.0	With RFP and Post Contract award

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No.	System/ Area	Document	Document No.	Rev.	Timing
1.7	Project-wide	Contractor Compliance File Assessment Checker	TRN-IMS-GRP-TMP -014.11	2.0	With RFP and Post Contract award
1.8	Project-wide	TPL Drawing Standards	PL100	05	With RFP and Post Contract award
1.9	Project-wide	TPL Plant & Equipment Tag Numbering Standard	PL101	06	With RFP and Post Contract award
1.10	Project-wide	TPL Equipment, Instrument & Electrical Symbology Standards	PL102	03	With RFP and Post Contract award
1.11	Project-wide	General Drawing Standard Handover of As-Built and Other Documents from TP to DO Work Instruction	PL103 TPL-TECH-DO-WI-001	08 01	With RFP and Post Contract award
1.12	Project-wide	Electrical Design Criteria	PL666	01	With RFP and Post Contract award
1.13	Project-wide	Process Control Network Standard	PL703	03	With RFP and Post Contract award
1.14	Project-wide	PLC, Metering and Server Panel Specification	E354086-00000-271-078-0025	02	With RFP and Post Contract award
1.15	Project-wide	Specification for Uninterruptible Power Supplies	PL720	04	With RFP and Post Contract award
1.16	Project-wide	Code of Practice for Cabling, Racking, Trenching & Earthing	PL727	11	With RFP and Post Contract award
1.17	Project-wide	Product Codes and Colours	2684358-P-SC0-CS-SP-001	00	Post Contract award
1.18	Project-wide	Automation Software Lifecycle Requirements Specification	H354086-00000-270-078-0001	0	With RFP and Post Contract award

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No.	System/ Area	Document	Document No.	Rev.	Timing
1.19	CMS	CMS Emerson Floboss S600+ Stream Flow Computer FDS	TPL-TECH-I-M-SPEC-016	4	With RFP and Post Contract award
1.20	CMS	CMS Emerson Floboss S600+ Prover Flow Computer FDS	TPL-TECH-I-M-SPEC-017	4	With RFP and Post Contract award
1.21	Project-wide	Safety Requirements Specification – General	H354086-00000-273-078-0001	0	With RFP and Post Contract award
1.22	Project-wide	Project Health and Safety Specification	H373204-00000-110-242-0001	0	With RFP and Post Contract award
1.23	Project-wide	Alarm Philosophy	H354086-00000-270-080-0001	B	With RFP and Post Contract award
1.24	Project-wide	Framework for Minimum Controls for Security in the Process Control Environment	TPL-TECH-MC&I-STD-PCE Security Controls Framework-006	3	With RFP and Post Contract award
1.25	Project-wide	NOC Migration Strategy	H373204-0099-270-242-0001	0	With RFP and Post Contract award
1.26	Project-wide	Baseline Health and Safety Risk Assessment	H373204-0000-110-060-0001	0	With RFP and Post Contract award
1.27	Project-wide	Inland Station Process Control System As-Is Design Basis	H373204-0000-270-610-0001	0	With RFP and Post Contract award
1.28	Project-wide	Inland Automation Project Document Handover Matrix	H373204-0000-720-026-0001	0	With RFP and Post Contract award
1.29	Project-wide	URS Compliance Assessment Matrix	E354086-00000-271-078-0019	01	Post Contract award
1.30	PCS/CMS	CBK Station Server Panel Layout Front View (to be used as a Typical)	E354086-00017-271-272-0005	4	With RFP and Post Contract award

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No.	System/ Area	Document	Document No.	Rev.	Timing
1.31	PCS	CBK Mainline Pump Manifold Discharge Pressure (SIL) 17-PT-323 (to be used as a Typical)	H354086-00017-270-262-0110	1	With RFP and Post Contract award
1.32	PCS	CBK MV Panel Layout Pump 01 & Pump 02 (to be used as a Typical)	E354086-00017-271-272-0006	3	With RFP and Post Contract award
2	Global	AVEVA OASyS DNA 2018 PCS Specifications – As Is			
2.1	PCS/CMS/PLMS	OASyS DNA SCADA Integrated HMI Style Guide	E354086-00000-271-078-0006	02	With RFP and Post Contract award
2.2	PCS/CMS	OASyS DNA SCADA PCS SCADA System FDS	E354086-00000-271-056-0018	01	With RFP and Post Contract award
2.3	PCS/CMS	OASyS DNA SCADA Configuration Plan	E354086-00000-271-078-0010	01	With RFP and Post Contract award
2.4	PCS/CMS	PCS PLC FDS	E354086-00000-271-078-0003	02	With RFP and Post Contract award
2.5	PCS/CMS	OASyS DNA SCADA PCS Control Module Specification	E354086-00000-271-078-0005	10	With RFP and Post Contract award
2.6	PCS/CMS	OASyS DNA SCADA PCS Report Plan	E354086-00000-271-078-0009	01	With RFP and Post Contract award
2.7	PCS/CMS/PLMS	OASyS DNA SCADA PCS SCADA/PLC Communications Plan	E354086-00000-271-078-0012	03	With RFP and Post Contract award
2.8	PCS/CMS/PLMS	OASyS DNA SCADA System Architecture Failure and Recovery Mode Analysis	E354086-00000-271-078-0013	03	With RFP and Post Contract award
2.9	PCS	OASyS DNA SCADA PLC System Architecture Failure and Recovery Mode Analysis	E354086-00000-271-078-0016	02	With RFP and Post Contract award

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No.	System/Area	Document	Document No.	Rev.	Timing
2.10	PCS/CMS/PLMS	OASyS DNA SCADA PCS Diagnostic FDS	E354086-00000-271-078-0027	01	With RFP and Post Contract award
2.11	LDS	OASyS DNA SCADA Leak Detection System FDS (Crude)	E354086-00000-271-078-0007	01	With RFP and Post Contract award
2.12	CMS	OASyS DNA SCADA Pipeline Operations – Liquids Metering System FDS	E354086-00000-271-078-0020	01	With RFP and Post Contract award
2.13	LDS	OASyS DNA SCADA PCS – Atmos Crude LDS Interface Control Document	E354086-00000-271-078-0029	BA	With RFP and Post Contract award
2.14	HMI Trainer	OASyS DNA SCADA PCS HMI Trainer System FDS	E354086-00000-271-078-0004	03	With RFP and Post Contract award
2.15	Replay	OASyS DNA SCADA PCS Replay Configuration Plan	E354086-00000-271-078-0011	01	With RFP and Post Contract award
2.16	PCS/CMS/PLMS	OASyS DNA SCADA PCS LAN Specification	E354086-00000-271-078-0002	01	With RFP and Post Contract award
2.17	PCS/CMS/PLMS	OASyS DNA SCADA PCS Network Security Specification	E354086-00000-271-078-0024	02	With RFP and Post Contract award
2.18	PCS/CMS/PLMS	OASyS DNA SCADA PCS Software Naming Standard	E354086-00000-271-050-0006	02	With RFP and Post Contract award
2.19	PCS/CMS/PLMS	OASyS DNA SCADA PCS Hardware Naming Standard	H354086-00000-270-078-0005	AC	With RFP and Post Contract award
2.20	PCS/CMS/PLMS	OASyS DNA SCADA PCS SCADA Software Coding Standard – Scripting	E354086-00000-271-050-0008	01	With RFP and Post Contract award
2.21	PCS/CMS/PLMS	OASyS DNA SCADA PCS PLC Software Coding Standard	E354086-00000-271-050-0004	03	With RFP and Post Contract award

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No.	System/ Area	Document	Document No.	Rev.	Timing
2.22	PCS/CMS/PLMS	OASyS DNA SCADA PCS System Performance Specification	E354086-00000-271-078-0014	02	With RFP and Post Contract award
2.23	CMS	OASyS DNA SCADA PCS Metering – SAP Interface Control Document	E354086-00000-271-078-0015	01	With RFP and Post Contract award
2.24	PCS/CMS/PLMS	OASyS DNA SCADA Alarm Configuration Database	H354086-00000-271-060-0001	E	With RFP and Post Contract award
2.25	PCS/CMS/PLMS	OASyS DNA SCADA PCS Diagnostics FDS	E354086-00000-271-078-0027	01	With RFP and Post Contract award
2.26	PCS/CMS/PLMS	Crude SCADA System Architecture	E354086-00000-271-256-0002	10	With RFP and Post Contract award
2.27	PCS/CMS/PLMS	Metering Test Panel	E354086-00000-271-272-0007	01	With RFP and Post Contract award
2.28	PCS/CMS/PLMS	KVM Network Architecture	E354086-00099-271-256-0002	4	With RFP and Post Contract award

Table A-2: Preliminary Designs

3	Inland Stations	Provisional Control System Architectures	Document No.	Rev.	Timing
3.1	Provisional Control System Architectures (SCADA)	Conceptual AVEVA Enterprise SCADA\OASyS Architecture	H373204-0000-270-256-0001	0	With RFP and Post Contract award
3.2	Provisional Control System Architectures (PLC)	Conceptual Schneider PLC Architecture	H373204-0000-270-256-0002	0	With RFP and Post Contract award

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4	Inland Stations	Provisional Panel General Arrangements	Document No.	Rev.	Timing
4.1	Provisional Metering Panel GAs	AIRPORT AVTUR/COASTAL AVTUR RUSTENBURG	H373204-0021-270-270-0001 H373204-0026-270-270-0001	0 0	With RFP and Post Contract award
4.2	Provisional PLC Panel GAs	AIRPORT AVTUR/COASTAL AVTUR	H373204-0021-270-270-0002	0	With RFP and Post Contract award

Table A-3: Inland Station As-Is Drawings and Documentation:

5	Inland Stations	Documentation and Drawings			
5.1	Site P&ID Drawings:	AIRPORT AVTUR AIRPORT COASTAL AVTUR ALRODE AVTUR ALRODE HP ALRODE LP ALRODE TANK FARM & BLENDING KENDAL KLERKSDORP LANGLAAGTE MEYERTON RUSTENBURG SASOLBURG LP SASOLBURG HP SECUNDA LP SECUNDA HP TARLTON HP & LP MANIFOLD TARLTON TANK FARM	PL115723 PL115724 PL118316 2684358-U-DS5-PR-PD-002, 2684358-U-DS5-PR-PD-004, 2684358-U-DS5-PR-PD-005 G52001-W4036-K999 G52001-U4020-K999-001 G52001-V4024-K999 PL118337 PL115758 G52001-U4016-K999-001, G52001-U4016-K999-002 PL122638, PL122636 G52001-R4025-K999-001, PL122550,	B A A 03 03 03 1.4 1.4 1.8 A C 1.0 1.7 A A 1.1 A	With RFP and Post Contract award

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		TARLTON ROAD LOADING TARLTON RAIL LOADING TARLTON ADDITIVE DOSING TARLTON REFRACTIONATOR – FEED BOTTOMS EXCHANGER TARLTON REFRACTIONATOR – DISTILLATION COLUMNS TARLTON REFRACTIONATOR – REFLUX DRUM TARLTON REFRACTIONATOR – FIRED HEATER TARLTON REFRACTIONATOR – FIRE WATER SYSTEM UFD TARLTON REFRACTIONATOR – AIR, POT WATER, NITROGEN TARLTON REFRACTIONATOR – FEED STORAGE ROAD OFFLOAD TARLTON REFRACTIONATOR – RAIL OFFLOAD TARLTON REFRACTIONATOR – PRODUCT STORAGE TARLTON REFRACTIONATOR – UTILITY FLOW TARLTON REFRACTIONATOR – PROCESS OILY WATER SYSTEM TARLTON REFRACTIONATOR – TANK FARM OILY WATER SYSTEM TARLTON REFRACTIONATOR – DISTILLATION COLUMN REBOILER FH001 TARLTON REFRACTIONATOR – DISTILLATION COLUMN REBOILER FH001 TARLTON REFRACTIONATOR – DISTILLATION COLUMN REBOILER FH001 WALTLOO WITBANK	PL122551, G52001-R4025-K999-004 PL121584 PL122651, PL122650, PL122653, PL122652, 25913-8820-25-1500, 25913-8820-25-1600, PL 121201, PL 121300, PL121338, PL121339, 25913-8820-25-1901, 25913-8820-25-1902 FH01-FD-801 FH01-FD-801 FH01-FD-801 G52001-V4022-K999 PL118266	A 1.3 B A A A A S1 S1 C C A A S1 S1 3A 3A 3A 1.0 B	
5.2	Site P&ID Drawings (PLMS only)	LAUNCHER 16INCH LINE TO ALRODE TRUNKLINE PIG RECEIVER (REF PL122593) JMP CONTROL VALVES JP0 JAMESON PARK DISPATCH MANIFOLD (REF FB-00014) HP4(JP1)-JMP-ALR MAINLINE PUMP P01 (REF FB-00030) HP4(JP1)-JMP-ALR MAINLINE PUMPS P02P03 (PETROL & JET) HP5(JP2)-JMP-WAO MAINLINE PUMP P04 (REF FB-00027) HP5(JP2)-JMP-WAO MAINLINE PUMP P05 (REF PL122600)	2684358-P-DS4-PR-PD-006 2684358-P-DS4-PR-PD-014 2684358-P-DS4-PR-PD-018 2684358-P-JP0-PR-PD-001 2684358-P-JP1-PR-PD-001 2684358-P-JP1-PR-PD-002 2684358-P-JP2-PR-PD-001 2684358-P-JP2-PR-PD-002	05 06 04 09 10 09 11 10	Post Contract Award

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	HP6(JP3)-JMP-ALR MAINLINE PUMP P06 (REF FB-00028)	2684358-P-JP3-PR-PD-001	11	
	HP6(JP3)-JMP-ALR MAINLINE PUMPS P07P08	2684358-P-JP3-PR-PD-002	10	
	JMP-TRUNKLINE RECEIVING & METERING (REF FB-00008)	2684358-P-TM2-PR-PD-002	05	
	JMP-TRUNKLINE MANIFOLD	2684358-P-TM2-PR-PD-003	05	
	JMP-ULSD BOOSTER PUMPS	2684358-P-TM2-PR-PD-027	07	
	JMP-ULSD & LSD BOOSTER PUMPS	2684358-P-TM2-PR-PD-028	07	
	JMP-95ULP BOOSTER PUMPS	2684358-P-TM2-PR-PD-030	07	
	JMP-93ULP & 95ULP BOOSTER PUMPS	2684358-P-TM2-PR-PD-031	07	
	JMP-JET FUEL BOOSTER PUMPS	2684358-P-TM2-PR-PD-033	07	
	JMP-INTERMIX BOOSTER PUMPS	2684358-P-TM2-PR-PD-034	09	
	TM2 SWITCHING MANIFOLD-MODEL	2684358-P-TM2-PR-PD-047	07	
	JMP SECUNDA RECEIVING & MANIFOLD	2684358-P-TM2-PR-PD-048	05	
	JMP COALBROOK RECEIVING & MANIFOLD	2684358-P-TM2-PR-PD-049	05	
	SECUNDA& COALBROOK MANIFOLD	2684358-P-TM2-PR-PD-050	07	
	JMP BYPASS & JP2 FLUSHING MANIFOLD	2684358-P-TM2-PR-PD-058	05	
	LP METERING MANIFOLD	LOEO-00173-PRC-FB-00008	02	
	LP METERING MANIFOLD	LOEO-00173-PRC-FB-00009	02	
	LP METERING MANIFOLD	LOEO-00173-PRC-FB-00010	02	
	LP METERING MANIFOLD	LOEO-00173-PRC-FB-00011	02	
	LP METERING MANIFOLD	LOEO-00173-PRC-FB-00012	02	
	LP METERING MANIFOLD	LOEO-00173-PRC-FB-00014	02	
	LP METERING MANIFOLD	LOEO-00173-PRC-FB-00016	02	
	LP METERING MANIFOLD	LOEO-00173-PRC-FB-00027	02	
	LP METERING MANIFOLD	LOEO-00173-PRC-FB-00028	02	
	LP METERING MANIFOLD	LOEO-00173-PRC-FB-00030	02	
	JAMESON PARK TRUNKLINE PIG RECEIVER	PL122593	A	
	HP5(JP2)-JMP-WAO P05 P&ID	PL122600	A	

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5.3	Site Typical Engineering Design Specifications:	INTAKE (SECUNDA) DELIVERY (LANGLAAGTE) TANK FARM AND DELIVERY (TARLTON) REFRACTIONATOR (TARLTON-IRP)	G52001-U4031-U001 G52001-V4024-U001 G52001-W4025-U010 G52001-T4043-U001	1.0 1.8 2.0 2.0	With RFP
5.4	Site Software Engineering Design Specifications:	AIRPORT AVTUR AIRPORT COASTAL AVTUR ALRODE AVTUR ALRODE MP KENDAL KLERKSDORP LANGLAAGTE MEYERTON RUSTENBURG SASOLBURG SECUNDA TARLTON MP TARLTON REFRACTIONATOR WALTLOO WITBANK	H373204-0021-270-078-0001 H373204-0021-270-078-0002 H373204-0018-270-078-0001 H373204-0018-270-078-0002 H373204-0036-270-078-0001 H373204-0020-270-078-0001 H373204-0024-270-078-0001 H373204-0037-270-078-0001 H373204-0026-270-078-0001 H373204-0016-270-078-0001 H373204-0031-270-078-0001 H373204-0025-270-078-0001 H373204-0043-270-078-0001 H373204-0022-270-078-0001 H373204-0027-270-078-0001	Approved Approved Approved Approved Approved Approved Approved Approved Approved Approved Approved Approved Approved Approved Approved	Post Contract award

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5.5	Site PLC I/O Schedules:	AIRPORT ALRODE KENDAL KLERKSDORP LANGLAAGTE MEYERTON RUSTENBURG SASOLBURG SECUNDA TARLTON TARLTON REFRACTIONATOR WALTLOO WITBANK	H373204-0021-270-216-0007 H373204-0018-270-216-0007 H373204-0036-270-216-0004 H373204-0020-270-216-0004 H373204-0024-270-216-0004 H373204-0037-270-216-0007 H373204-0026-270-216-0004 H373204-0016-270-216-0004 H373204-0031-270-216-0004 H373204-0025-270-216-0004 H373204-0043-270-216-0004 H373204-0022-270-216-0004 H373204-0027-270-216-0004	Approved Approved Approved Approved Approved Approved Approved Approved Approved Approved Approved Approved Approved	Post Contract award
5.6	PLC Panel GAs	AIRPORT AVTUR/COASTAL AVTUR ALRODE AVTUR ALRODE MP KENDAL KLERKSDORP LANGLAAGTE MEYERTON RUSTENBURG SASOLBURG SECUNDA	G52001-L4021-A001-001/002 G52001-L4018-A003-001/002 G52001-L4018-A001-001/002, G52001-L4018-A002-001/002 G52001-W4036-A001-001/002 G52001-U4020-A001-001/002 G52001-V4024-A001-001/002 G52001-L4037-A001-001/002 PL117400-001/G52001-N4026-A001-001, PL117400-001/G52001-N4026-A001-001 G52001-U4016-A001-001/002, G52001-U4016-A002-001/002 G52001-U4031-A001-001/002, G52001-U4031-A002-001/002	1.0/1.0 1.0/1.0 1.0/1.0, 1.0/1.0 1.1/1.0 1.1/1.1 1.2/1.0 1.1/1.2 1.2 1.3 1.2/1.3 1.0/1.0 1.0/1.2 1.0/1.1	Post Contract award

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		TARLTON MP TARLTON REFRACTIONATOR WALTLOO WITBANK	G52001-W4025-A001-001/002, G52001-W4025-A002-001/002, G52001-W4025-A102-001/002 G52001-T4043-A001-001/002 G52001-V4022-A001-001/002 G52001-U4027-A001-001/002	1.0/1.0 1.0/1.1 1.0/1.0 1.0/1.0 1.0/1.0 1.0/1.0	
5.7	PLC Remote Panel GAs	ALRODE MP KLERKSDORP WALTLOO	G52001-L4018-A009-001 SHT1 G52001-L4018-A009-001 SHT2 G52001-L4018-A009-001 SHT3 G52001-L4018-A009-001 SHT4 G52001-U4020-A009 G52001-U4020-A011 DI-118696	1.0 1.0 1.0 1.0 1.2 1.2 1.0	Post Contract award
5.8	Metering Panel GAs	AIRPORT AVTUR/COASTAL AVTUR ALRODE MP KLERKSDORP LANGLAAGTE RUSTENBURG SASOLBURG SECUNDA TARLTON MP WALTLOO WITBANK	G52001-L4021-V475-1 G52001-L4018-A050-001/002 G52001-U4020-A050-001/002 G52001-V4024-A050-001/002 G52001-N4026-V475 G52001-L4016-A050-001/002 G52001-L4031-A050-001/002 G52001-W4025-A050-001/002 G52001-V4022-A050-001/002 G52001-U4027-A050-001/002	1.0 1.0/1.0 1.2/1.1 1.1/1.1 1.0 1.0/1.0 1.0/1.0 1.0/1.0 1.0/1.0 1.0/1.0	Post Contract award
5.9	Server Panel GAs	KLERKSDORP LANGLAAGTE SECUNDA	G52001-U4020-A080 G52001-V4024-A080/081 G52001-V4024-A070 G52001-U4031-A080	1.0 1.0/1.0 1.1 1.0	Post Contract award

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		TARLTON MP	G52001-U4031-A070 G52001-W4025-A080 G52001-W4025-A081 G52001-W4025-A083 G52001-W4025-A086 G52001-W4025-A070 G52001-W4025-A071 G52001-V4022-A080/081 G52001-V4022-A070	1.1 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	
		WALTLOO WITBANK			
5.10	Electrical LV Panel Remote IO Backplate GAs	AIRPORT AVTUR/COASTAL AVTUR – GA, AIRPORT AVTUR/COASTAL AVTUR - ET200 GA ALRODE KENDAL KLERKSDORP LANGLAAGTE MEYERTON – GA, MEYERTON – ET200 GA RUSTENBURG SASOLBURG SECUNDA TARLTON MP TARLTON REFRACTIONATOR WALTLOO WITBANK	60337-S01-01/02 G52001-L4021-A002-001 G52001-L4018-A005-001/002 G52001-W4036-A005/A006 G52001-U4020-A005/A006 G52001-V4024-A005/A006 40476-MTN-S03 G52001-L4037-A002-001 G52001-N4026-A002/A005 G52001-U4016-A005/A006 G52001-U4031-A005/A006 G52001-R4025-A200-001/002 G52001-R4025-A201-001/002 G52001-R4025-A202-001/002 G52001-R4025-A203-001/002 G52001-T4043-A005/A006 G52001-V4022-A005/A006 G52001-U4027-A005/A006	0 1.0 1.0/1.0 1.4/1.3 1.2/1.1 1.4/1.4 0 1.1 1.2/1.3 1.2/1.2 1.2/1.0 1.0/1.0 1.0/1.0 1.0/1.0 1.0/1.0 1.0/1.0 1.2/1.3	Post Contract award

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5.11	Electrical MV Panel Remote IO Backplate GAs	ALRODE – ETM: A02, P01	G52001-L4018-A936-001	1.0	Post Contract award
		ALRODE – ETM: A01, P02	G52001-L4018-A936-002	1.0	
		ALRODE – ETM: A03, P03	G52001-L4018-A936-003	1.0	
		ALRODE – ETM: P05, P04	G52001-L4018-A936-004	1.0	
		ALRODE – ETM: P08, P06	G52001-L4018-A936-005	1.0	
		ALRODE – ETM: 3.3KV MV PANEL	G52001-L4018-A015-001	1.0	
		ALRODE – ETM: 6.6KV MV PANEL	G52001-L4018-A016-002	1.0	
		SASOLBURG – ETM: P01	G52001-L4016-A103	1.0	
		SASOLBURG – ETM: P02	G52001-L4016-A104	1.0	
		SASOLBURG – ETM: P03	G52001-L4016-A105	1.0	
		SASOLBURG – ETM: P04	G52001-L4016-A106	1.0	
		SASOLBURG – ETM: P05	G52001-L4016-A107	1.0	
		SASOLBURG – ETM: P06	G52001-L4016-A108	1.0	
		SASOLBURG – ETM: 3.3KV MV PANEL	G52001-L4016-A101	1.0	
		SASOLBURG – ETM: 3.3KV MV PANEL	G52001-L4016-A015	1.0	
		SECUNDA – ETM: 11KV MV PANEL	G52001-U4031-A015	1.0	
		WITBANK – ETM: P08, P06	G52001-U4027-A090	1.1	
		WITBANK – ETM: 3.3KV MV PANEL	G52001-U4027-A101	1.1	
		WITBANK – ETM: 6.6KV MV PANEL	G52001-U4027-A015	1.0	

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Appendix B: Inland Station PCS Design Basis

STATUS MAY 2024		EXECUTION PHASE 2A			EXECUTION PHASE 2B						EXECUTION PHASE 2C					EXECUTION PHASE 2D			EXECUTION PHASE 2E				
	Site Schedule	Megerton (MTN)	Alrode AV (ALR)	Alroport (APT)	Phase 2B Units	Langlaagte (LLA)	Tarleton (TRL)	Rustenburg (RTR)	Alrode MP (ALR)	PL2 MBVs (MBV2, MBV3, MBV6) *	PL3 MBVs (MBV10) *	Phase 2C Units	Kendal (KDL)	Witbank (WIB)	Valdoo (VAD)	Secunda (SEC)	PL4 MBVs (MBV7, MBV15) *	Phase 2D Units	Sasolburg (SDB)	Klerksdorp (KRP)	Phase 2E Units	Tarleton Refractionator	
1	Site Data																						
1.01	Station Type	Booster Pump Station	Pump Station	Delivery Station		Delivery, Pump Station, Storage Depot	Delivery, Pump Station, Storage Depot, Road Loading, Rail Loading, Additive Dosing	Delivery Station	Delivery, Pump Station, Storage Depot	Motorised Block Valves	Motorised Block Valves		Switching Station	Delivery Station, Storage Depot	Delivery Station, Storage Depot	Intake, Pump Station	Motorised Block Valves		Intake, Pump Station	Delivery Station, Storage Depot		Refractionator	
1.02	PCS System details (Existing)	Siemens L5X, Simatic S7 PLCs	Siemens L5X, Simatic S7 PLCs	Siemens L5X, Simatic S7 PLCs		Siemens PCS7, Simatic S7 PLCs	Siemens PCS7, Simatic S7 PLCs	Siemens L5X, Simatic S7 PLCs	Siemens L5X, Simatic S7 PLCs	Siemens Simatic S300 PLCs	Siemens Simatic S300 PLCs		Siemens PCS7, Simatic S7 PLCs	Siemens L5X, Simatic S7 PLCs	Siemens PCS7, Simatic S7 PLCs	Siemens L5X, Simatic S7 PLCs	Siemens Simatic S300 PLCs		Siemens L5X, Simatic S7 PLCs	Siemens L5X, Simatic S7 PLCs		Siemens L5X, Simatic S7 PLCs	
1.03	Metering Manifold Configuration	-	-	AV Manifold 1x Product 1x Prover CAV Manifold 1x Product 1x Prover		6 x Product 1x Prover	3 x Product 1x Internal 1x Prover	3 x Product 1x Prover	6 x Product 1x Internal 1x Prover	-	-			6 x Product 1x Internal 1x Prover	6 x Product 1x Internal 1x Prover	6 x Product 2x Prover	-		6 x Product 2x Prover	3 x Product 1x Internal 1x Prover		-	
1.04	Metering Flow Computers	-	-	4 x micro5000		7 x S600+	5 x S600+	4 x micro5000	8 x S600	-	-		-	8 x S600	8 x S600+	8 x S600+	-		8 x S600	6 x S600		-	
2	Devices																						
2.01	Receivers	-	1	1		4	1	1	1	-	-		6	3	1	1	-		2	1	1	8	-
2.02	Launchers	-	1	-		4	1	1	-	2	-		6	2	-	-	3	-	3	3	-	8	-
2.03	Motors DOL 3.3kV	1	1	-		9	-	-	-	9	-		11	-	3	-	8	-	6	6	-	8	-
2.04	Motors VSD 3.3kV	-	-	-		0	-	-	-	-	-		6	-	-	-	-	-	0	-	-	8	-
2.05	Motors DOL 400V	7	1	3		76	9	49	4	14	-		27	2	7	9	9		16	9	7	16	10
2.06	Custody Meter Manifolds	-	-	2		21	7	4	2	7	-		28	-	7	7	6	-	13	6	7	9	-
2.07	Provers	-	-	2		4	1	1	1	1	-		4	-	1	1	2	-	3	2	1	9	-
2.08	Prover Transfer Tanks	-	-	1		6	1	1	1	3	-		7	-	3	3	1	-	5	2	3	9	-
2.09	Interim Tanks	-	-	-		11	1	3	3	4	-		8	1	4	3	-	-	4	-	4	2	2
2.10	Accumulator Tanks	-	-	-		16	3	9	-	4	-		7	-	5	2	-		0	-	-	3	3
2.11	Valves (Actuated)	6	14	29		479	32	166	38	239	3	1	274	43	99	115	115	2	103	87	82	28	21
2.12	Road Loading	-	-	-		17	1	12	1	3	-		3	1	1	1	-		1	1	-	1	1
2.13	Rail Loading	-	-	-		7	-	7	-	-	-		0	-	-	-	-		0	-	-	3	3
2.14	Additive Dosing Tanks	-	-	-		12	-	12	-	-	-		0	-	-	-	-		0	-	-	8	-
2.15	Gas Barrier System	-	-	-		0	-	-	-	-	-		0	-	-	-	-		0	-	-	1	1
2.16	Distillation Columns	-	-	-		0	-	-	-	-	-		0	-	-	-	-		0	-	-	1	1

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3	IO Counts ¹⁾	158	156	228	4 836	325	1 684	373	1 852	57	19	3 427	335	983	932	1 099	38	1 885	1 341	664	423	423
3.01	Total DI Quantity	94	89	207	2 026	155	1 058	244	1 125	28	13	2 177	267	596	535	703	26	1 095	798	287	387	387
3.02	Total DO Quantity	32	33	75	1 374	287	440	133	522	9	3	872	109	244	312	391	6	482	291	201	50	50
3.03	Total AI Quantity	23	32	46	462	62	109	29	160	9	3	251	13	68	79	86	6	165	120	55	16	16
3.04	Total AO Quantity	1	2	2	19	7	1	2	9	-	-	15	2	4	4	5	-	23	7	16	8	8
3.05	Total FI Quantity	0	0	0	15	4	4	1	6	-	-	12	4	1	3	4	-	18	5	5	0	-
3.06	Total DI SS Quantity	-	-	-	0	-	-	-	-	-	-	0	-	-	-	-	-	0	-	-	73	73
3.07	Total DO SS Quantity	-	-	-	0	-	-	-	-	-	-	0	-	-	-	-	-	0	-	-	59	59
3.08	Total AI SS Quantity	-	-	-	0	-	-	-	-	-	-	0	-	-	-	-	-	0	-	-	32	32
3.09	Total AO SS Quantity	-	-	-	0	-	-	-	-	-	-	0	-	-	-	-	-	0	-	-	4	4
4	Hardware																					
4.01	PCS Panel/Tiers	M2	M3	M5		M6	M6, M4, M3	M4	M6, M3	M1	M1		M6	M7	M9	M7, M4	M1		M7, M4	M6		M7
4.02	CMS Panel/Tiers	-	-	M1		M3	M3	M2	M3	-	-		-	M3	M3	M3	-		M3	M3		-
4.03	Server Panel/Tiers	M1	M1	M1		M1	M1, M1	M1	M1	-	-		M1	M1	M1	M1	M1		M1	M1	M1	M1
4.04	LY Panel/Tiers	M6	See ALRMP	M5		M6	M6, M5, M3, M6	M5	M3	M1	M1		M7	M7	M9	M9	M1		M9	M6		M3
4.05	MV ETM Panel/Tiers	M1	See ALRMP	-		-	-	-	M1	-	-		-	M1	-	M1	-		M1	-		-
4.06	PCS Workstations/Screens ²⁾	M3	M3	2M3		2M3	2M3, M3	2M3	2M3	-	-		M3	2M3	2M3	2M3	-		2M3	2M3		M3

- Notes:
1. IO counts reflect existing signal to spare capacity.
 2. PCS Workstations/Screens support DASIS standard.
 3. MBR included for PLMS scope/automation scope.

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Appendix C: Contractor's Deliverables

Note: There are 13 sites, but ALR will have two separate control systems, installations, commissioning and handovers (14x systems + MCC + SCC)

C1: Phase 1 – Development

1	System/Area	Task	Deliverable	Works Info Section
1.01	Global	Project, Quality & Safety Management	Documentation Project Management - Monthly Programme (Schedule) Update - Monthly Cost Report - Monthly Document Register Update - Monthly Progress Report Quality Management - Monthly Progress of QCP's - Monthly Quality Management Report Risk Management - Monthly Project Risk Register Update Document Management - Monthly Cashflow Forecast	4.1.3.1

1	System/ Area	Task	Deliverable	Works Info Section
1.02	Global	Project Setup	Documentation Project Management - Project Execution Plan and Supporting Procedures - Baseline Schedule and Basis of Schedule (Programme) - Project Safety Management Plan - Project Safety File Quality Management - Project Quality Management Plan - Software Lifecycle Plan (SLCP) - Software Configuration Management Plan (SCMP) - Prepare Development Phase QCP's - Prepare Execution Phase QCP's Risk Management - Project Risk Register (Baseline) Templates: - Documentation Template - Drawing Templates Document Management: - Master Document and Drawing Register (updated with latest status of each document) Equipment and Systems Electronic Document Management System Cost Management System Software Development Tools	4.1.3.2
1.03	Global	Deployment – PCS/CMS/PLMS Staging System	Documentation Staging System Architecture (1x) Staging System Topology (1x) Staging System Panel General Arrangement (1x) Staging System Power Distribution (1x) Equipment Staging System for development, testing and configuration of the Inland Station/MCC PCS/CMS/PLMS Software on project hardware and development licenses.	4.1.3.3, 4.2.3.8.1

1	System/Area	Task	Deliverable	Works Info Section
1.04	Global	PCS/CMS Global System Design	Specifications and Plans Station SCADA Architecture (14x) Station PLC Architecture (14x) SCC SCADA Architecture NOC SCADA Architecture HMI Trainer Architecture OASyS Documentation as per Table 1-2 (updates) AES Documentation as per Table 1-2, using OASyS Documents as a basis (new) Documentation Gap Analysis Report for TPL Control Module Library (2018) versus new developments contained in latest release of AVEVA Enterprise SCADA software (2022). Deployment Strategy (OASyS 2018) Deployment Strategy (HMI Trainer) ISA 62443\Cyber Security Plan\Specification ISA 62443\Cyber Security High Level Risk Assessment ISA 62443\Cyber Security Vulnerability Risk Assessment ISA 62443\Cyber Security Cyber Risk Assessment ISA 62443\Cyber Security Zoned Architecture ISA 62443\Cyber Security Compliance Assessment Report API1164 Rev3\Security Compliance Assessment Report Quality Documentation Architecture Thinslice Record	4.1.3.4
1.05	Global	PCS/CMS Global Software Development (Control Modules Update and New)	Software AES202x Control Module Software Library Code (SCADA, PLC) Specifications and Plans AES Control Module Specification	4.1.3.5, 4.1.3.6
1.06	Global	PCS/CMS Global Software Development (Tank Gauging and Tank States)	Software Tank Gauging and Tank State Source Code and Binaries Specifications and Plans AES Integrated HMI Style Guide AES SCADA System FDS AES Metering FDS AES PCS Report Plan AES Control Module Specification Tank Gauging System ICD	4.1.3.5, 4.1.3.6

1	System/ Area	Task	Deliverable	Works Info Section
1.07	Global	PCS/CMS Global Software Development (Host Metering and Custody Update)	Software Host Metering Source Code and Binaries Custody Metering Source Code and Binaries Specifications and Plans AES Integrated HMI Style Guide AES Metering FDS AES Metering – SAP ICD AES PCS Report Plan AES Control Module Specification AES S600+ ICD (update)	4.1.3.5, 4.1.3.6
1.08	Global	PCS/CMS Global Software Testing	Quality Control Module Software Test Plans Control Module Library SCADA and PLC Software Testing Control Module Thinslice Records Control Module Software iFAT Records Control Module Software cFAT Records Tank Gauging Software Test Plans Tank Gauging SCADA and PLC Software Testing Tank Gauging Thinslice Records Tank Gauging Software iFAT Records Tank Gauging Software cFAT Records Host and Custody Metering SCADA and PLC Software Testing Host and Custody Metering Software Test Plans Host and Custody Metering Thinslice Records Host and Custody Metering Software iFAT Records Host and Custody Metering Software cFAT Records	4.1.3.6
1.09	Global	PLMS Global System Design	Documentation Inland Network Simplified Process Flow Diagrams OASyS Leak Detection FDS AES PLMS FDS NOC SCADA Architecture OASyS\AES Atmos ICD AES PLMS-PCS7 ICD PLMS Deployment Plan	4.1.3.7

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1	System/Area	Task	Deliverable	Works Info Section
1.10	Inland Stations/MCC/SCC	Field E&I Installation Works for Inland Stations/MCC/SCC	Documentation Detailed E&I Installation Scopes of Work and Bills of Quantity - Station Works (14x) - SCC - MCC - HMI Trainer - E&I Installation RFP - Tender Adjudication Other Safety and IS Design supporting documents to enable Employer SIS engineering (including Safety Manuals, Equipment Certificates)	4.1.3.8
1.11	Inland Stations	Procurement: Long Lead Items	Documentation Materials Management Register Procurement Tracking Register (Update) Equipment Emerson S600+ CPU's (incl. firmware upgrade), cases, cover-plates PLC Hardware System hardware, software and licenses.	4.1.3.9, 4.2.3.1
1.12	Global	Employer's Design Review	Specifications and Plans Data Pack, including verified documentation and a complete set of development/built history records. System Compliance Matrix (Update).	4.1.4

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C2: Phase 2 – Detail Engineering & Execution – Respective Inland Stations, MCC, SCC and HMI Training System

2.	System/Area	Activity	Deliverable	Works Info Section
2.01	Global	Project, Quality and Safety Management	Documentation Project Management - Monthly Programme (Schedule) Update - Monthly Cost Report - Monthly Document Register Update - Monthly Progress Report Quality Management - Monthly Progress of QCP's - Monthly Quality Management Report Risk Management - Monthly Project Risk Register Update Document Management - Monthly Cashflow Forecast Safety Management - Site Safety Files Procurement - Procurement Tracking Register (Update) - Materials Management Register (Update) - Management and supervision of E&I Installation Works	4.2.3.1
2.02	Inland Station	PCS/CMS System Engineering	Station Specifications and Documentation Network Topology Designs (14x) PCS BOQs (14x) Field Equipment BOQs (14x) Station PLC FDS (14x) Station Software License Register (14x) Station Configuration Sheets (14 sets) Commissioning and Maintenance Spares Lists (1x) Input Documentation Station PCS/CMS EDS (13x) (Redline) Range, Alarm and Trip Schedules (14x) (Redline) IO Lists (14x) (Redline)	4.2.3.2
2.03	MCC	PCS/CMS System Engineering	MCC Specifications and Documentation Network Topology Designs (1 set) PCS BOQs (1x) MCC Software License Register (1 set) MCC Configuration Sheets (1 sets) Videowall Patching and Topology (1x) (update) Firewall Configuration and specification (update) Commissioning and Maintenance Spares Lists (1x) Diagnostics Systems FDS	4.2.3.3

2.	System/Area	Activity	Deliverable	Works Info Section
			Equipment Deployed Software Backup Tool – ACRONIS (x13 licenses), miniNAS or portable hard drives Deployed Diagnostics Audit Tool – Microsoft Extra ID Audit Tool Input Documentation NOC Migration Strategy (Redline)	
2.04	SCC	PCS/CMS System Engineering	SCC Specifications and Documentation Network Topology Designs (1 set) PCS BOQs (1x) Desk Patching Topology SCC Software License Register(1 set) SCC Configuration Sheets (1 sets)	4.2.3.4
2.05	HMI Trainer	PCS/CMS System Engineering	HMI Trainer Specifications and Documentation Network Topology Designs (1 set) PCS BOQs (1x) AES HMI Trainer FDS HMI Trainer Configuration Sheets (1 sets) HMI Trainer OASyS\AES2x Changeover Procedure	4.2.3.5
2.06	Inland Station, MCC, HMI Training System	Procurement – General (Inland Stations/ MCC/ SCC/ School Of Pipelines)	Specifications and Plans Materials Management Schedule Procurement Tracking Register Panel Design Inputs (Redline) Equipment PLC Hardware System hardware, software and licenses.	4.2.3.6
2.07	Inland Station, MCC, HMI Training System	Procurement, Fabrication, Testing, Delivery of Panels (Inland Stations/ MCC/SCC):	Documentation Design Documentation (update/redline) Equipment and Panels PLC, Metering, Server, Electrical LV Panel Remote IO, MV Panel Remote IO (on a per station, just-in-time basis) Quality Documentation Hardware Panel FAT Procedure Hardware and Panel iFATs Record Hardware and Panel cFATs Record Anomaly Lists and Correction Records	4.2.3.7
2.08	Avtur Stations/ MCC	Inland Station/MCC PCS/CMS Software Design, Development,	Specification and Plans OASyS Station PLC FDS (3x) OASyS SCADA FDS (1x) (update) Station Masterfile	4.2.3.8

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2.	System/Area	Activity	Deliverable	Works Info Section
		Testing, and Integration Testing	Flow Computer Configuration Records Equipment Checksheets Station MODBUS Map (3x) Software Staged OASys 2018 System Avtur Station software Backups Input Documentation Station IO List (redline) Station EDS (redline) Station RAT (redline) Alarm Database (redline) Quality Documentation Station PLC Code Review Report (3x) Station SCADA Code Review Report (3x) SCADA HMI Graphics Report incl. Linewise graphics (3x) FAT Procedure (3x) Thinslice Records iFAT Records (3x) cFAT Records (3x) Anomaly Lists and Correction Records	
2.09	MP Inland Stations/ MCC	Inland Station/MCC PCS/CMS Software Design, Development, Testing, and Integration Testing	Specification and Plans AES202x Station PLC FDS (11x) AES202x SCADA FDS (1x) All affected PCS system documentation (1 set) Station Masterfile Flow Computer Configuration Records Equipment Checksheets Station MODBUS Map (11x) Software Staged AES202x System Station software Backups Input Documentation Station IO List (redline) Station EDS (redline) Station RAT (redline) Alarm Database (redline) Quality Documentation Station PLC Code Review Report (11x) Station SCADA Code Review Report (11x)	4.2.3.8

2.	System/Area	Activity	Deliverable	Works Info Section
			SCADA HMI Graphics Report incl. Linewide graphics (11x) FAT Procedure (11x) Thinslice Records iFAT Records (11x) cFAT Records (11x) Anomaly Lists and Correction Records	
2.10	Inland Station	Inland Station Installation, Changeover and Commissioning	Specification and Plans All affected PCS system documentation (1 set) Station Masterfile (14x) Station Integration Procedure (14x) Station System Change-over plan (1x) Station Commissioning Plan (14x) Shutdown Readiness SOP (14x) Software Commissioned System (14x) Station software Backups (14x) Station E&I Installation Works (14x) Electrical CoCs (14x) Input Documentation Station IO List (redline) Station EDS (redline) Station RAT (redline) Alarm Database (redline) Quality Documentation Station SAT Procedure (14x) SAT Records (14x) Anomaly Lists and Correction Records PCS/CMS System Performance SAT Records (14x)	4.2.3.9
2.11	MCC, SCC	MCC, SCC Installation, Changeover and Commissioning	Specification and Plans All affected PCS system documentation (1 set) Station Masterfile (2x) MCC Integration Procedure (1x) MCC System Changeover Plan (1x) Software Commissioned System PLMS System MCC software Backups Diagnostic Tool (Acronis, MS Audit, Version Tool) Configuration	4.2.3.9

2.	System/Area	Activity	Deliverable	Works Info Section
			MCC, SCC E&I Installation Works (2x) Electrical CoCs (2x) Quality Documentation MCC, SCC SAT Procedure (1x) SAT Records (1x) PLMS SAT Procedure (1x) (per segment) PLMS SAT Records (1x) (per segment) Anomaly Lists and Correction Records PCS/CMS System Performance SAT Records (1x)	
2.12	Inland Station, MCC/SCC	Inland Station/MCC/SCC Handover	Documentation System Data Pack (14x + MCC + SCC), including: • Verified as-built documentation (provided in part by Contractor and Consultant) • Complete set of development/built/test history records for software, hardware • Software Backup • System and Equipment Configuration Procedure and Records • System Operating, Maintenance Procedures • OEM Equipment Manuals • Software Simulator and Test Objects used in the station software development tests and FATs. • Maintenance Spares (on a per site basis)	4.2.3.10
	Operational Readiness			
2.13	Global	Operational Readiness: Operations Training	Documentation Operations Train-the Trainer Training Course Material (2 sets) Update of TPL existing system specific procedures and/or work instructions Training PCS/PLMS Project-tailored Operations Training Courses: • 1 x Trainer Course (2 persons, 3 days) • 3 x SCO Courses (3 persons, 1 day)	4.6.1

2.	System/Area	Activity	Deliverable	Works Info Section
2.14	Global	Operational Readiness: Technical Training	Documentation Technical and Maintenance Manuals Equipment Manuals Training Formal Product Technical Training Courses (OEM): 1 x AVEVA Enterprise SCADA Intermediate Course Workshop in South Africa for 10 persons, 15 days 1 x AVEVA Enterprise SCADA Advanced Course Workshop in South Africa for 10 persons, 15 days - Schneider EcoStruxure Control Expert Programming course for 6 persons - PCS Project-tailored technical training courses, on project specific maintenance procedures.	4.6.2
2.15	Global	Maintenance and Support	Maintenance and Support Plan (Service Level Agreement for the duration of the project + 12 month warranty period)	4.6.3
	HMI Trainer			
2.16	HMI Training System	HMI Training System - Staging and Development	Specification and Plans AES202x HMI Trainer FDS (1x) All affected PCS system documentation (1 set) Station Masterfile (1x) Equipment Checksheets Software Staged\Upgraded AES202x System Station software Backups Quality Documentation HMI Trainer SCADA Code Review Report (1x) FAT Procedure (1x) Thinslice Records (1x) iFAT Records (1x) cFAT Records (1x) Anomaly Lists and Correction Records (1x)	4.2.3.11
2.17	HMI Training System	System Installation and Commissioning	Specification and Plans All affected PCS system documentation (1 set) Station Masterfile Software Commissioned System Station software Backups Station E&I Installation Works (1x) Electrical CoCs (1x)	4.2.3.11

2.	System/Area	Activity	Deliverable	Works Info Section
			Quality Documentation Station SAT Procedure (1x) SAT Records (1x) Anomaly Lists and Correction Records	
2.18	HMI Training System	System Handover	Documentation System Data Pack, including: - Verified as-built documentation (provided in part by Contractor and Consultant) - Complete set of development/built/test history records for software, hardware - Software Backup - System and Equipment Configuration Procedure and Records - System Operating, Maintenance Procedures - OEM Equipment Manuals	4.2.3.11
	PLMS			
2.19	PLMS	PLMS Development - Staging	Specification and Plans SimSuite LDS Integration Procedure (1x) PIM PLMS Integration Procedure (1x) Equipment Checksheets Software Staged OASyS 2018 SimSuite System Staged AES202x PIM System Quality Documentation Anomaly Lists and Correction Records	4.3.3.3.1
2.20	PLMS	PLMS Development / PLMS Validation	Specification and Plans AES202x PLMS FDS (1x) OASyS LDS FDS (1x) (update) All affected PCS system documentation (1 set) PLMS Masterfile Equipment Checksheets Software AES202x PLMS System OASyS LDS System Quality Documentation LDS and PLMS Code Review Report SCADA HMI Graphics Report (multiple) FAT Procedure (multiple) Thinslice Records	4.3.3.3.2, 4.3.3.3.3

2.	System/Area	Activity	Deliverable	Works Info Section
			iFAT Records (multiple) cFAT Records (multiple) Anomaly Lists and Correction Records	
2.21	PLMS	PLMS Installation, Commissioning, Tuning	Specification and Plans All affected LDS and PLMS system documentation (1 set) LDS and PLMS Masterfile LDS and Integration Procedure (2x) Instrument Assessment (1 per deployment) Tuning Report (1 per deployment) Software Commissioned PLMS System Quality Documentation MCC LDS and LDS SAT Procedure (1 per deployment) SAT Records (1 per deployment) Anomaly Lists and Correction Records	4.3.3.4
	Project Closeout			
2.22	Global	Project Closeout	Documentation Automation System Performance Test Report Verified as-built documentation (15x packs) Complete set of development/built/test history records for software, hardware Software Backups System and Equipment Configuration Procedure and Records System Operating, Maintenance Procedures OEM Equipment Manuals Software Simulator and Test Objects used in the station software development tests and FATs. Equipment Commissioning Spares are issued to the <i>Employer</i>	4.5.3

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Appendix D: Panel *Works* Design Basis (PLC, MET, SRV, LV, MV)

The following is a summary of the Panel Works that is required to be performed on each of the Inland Stations, MCC and SCC.

- Where existing panels are to be re-used, the modifications required to be made to the panels are listed below. This work will be completed during station changeover activities and will be priced as part of E&I Installation activities in Phase 1 of the project.

- **In Place Replacement:**

- The existing PLC (incl backplane), existing remote IO and wiring looms are replaced with the Schneider equipment on the existing backplate. The terminals which the Siemens S7 ET200M was terminated to, are retained in the rear of the panels. (PLC, LV, MV ETM and Metering Panels)
- Power supplies are replaced with Schneider specified power supply with voting unit (as required). (PLC, LV and Metering Panels)
- The Range extenders for all sphere detectors and associated wiring to be removed as required. (PLC Panels)
- Replacement of Siemens Profibus Fibre Optic Link Modules (OLMs) with approved Ethernet fibre optic modules. (PLC, LV)
- Additional of 220V breakers to J51 rail for the supply of IO rack power supplies.
- The S600 is replaced with a S600+ (CPU and faceplate) (where required), the loom cables retained. (Metering Panels)
- Remove Pocket pad and associated power supply and wiring. (Metering Panels)
- All terminal strip markers, group markers, trafalite markers are replaced as required.
- Power distribution is redone during the shutdown to match designs for all new equipment
- Work is performed on site in the panel during a shutdown.
- Pre-works may be done before for core markers and labelling as required.

- **Back-Plane replacement (MV DOL only):**

- The PLC, power supply distribution, remote IO and wiring looms are replaced with the Schneider equipment on a new backplane. Refer to typical drawing (CBK as Typical [37]). (MV DOL)
- The backplane is replaced on site in the panel during a shutdown.
- The termination of the loom to the landing terminals occurs during the shutdown.

- **SIS Modifications**

- The PLC panel is modified during the shutdown to include the SIS tank overflow and line over pressure. Refer to Typical loop drawings and layouts (CBK as Typical **Error! Reference source not found.**,[37])

2. The following new panels are required to be provided during the Execution Phase of the project. These panels are to be priced and included in the Activity Schedule forming part of the RFP.

- **New Panel (Server, PLC and Metering):**

- Supply of a new panel as per GA ([32],[33],[34]).
- Supply of new panel as per GA (CBK as Typical Server [35])
- Panel is installed during the shutdown complete with power and earthing.

The quantities are given in the Design Basis Appendix B.

Table 4: Station Panel Changeover

#	Station	Panel	In Place Replacement	Back-plane replacement	SIS Modifications (Addition of SIL Trip Amps)	New Panel	Notes
16	Sasolburg	PLC Panel	2		3		
		Metering Panel	1				
		Server Panel				1	
		LV Panel	1				
		MV Panel	2	6			6 MV DOLs, 2 ETMs
18	Alrode AV	PLC Panel	1		-		1 LOP SIF
		Metering Panel	-				
		Server Panel				1	
		MV Panel		1			
		LV Panel	1				
18	Alrode MP	PLC Panel	2		10		8 TOP and 2 LOP SIFs
		Metering Panel	1				
		Server Panel				1	
		MV Panel	2	6			10 MV DOL and 2 ETM
		LV Panel	1				
		Remote ET Panels	4				
20	Klerksdorp	PLC Panel	1				
		Metering Panel	1				
		Server Panel				1	
		LV Panel	1				
		Remote ET Panels	2				
21	Airport	PLC Panel			-	1	Panel replaced due to old core idents
		Metering Panel				1	Panel replaced – micro5000 FEPs
		Server Panel				1	
		LV Panel	1				
22	Waltloo	PLC Panel	1				

#	Station	Panel	In Place Replacement	Back-plane replacement	SIS Modifications (Addition of SIL Trip Amps)	New Panel	Notes
		Metering Panel	1				
		Server Panel	1				
		LV Panel	1				
		Remote ET Panels	1				
24	Langlaagte	PLC Panel	1				
		Metering Panel	1				
		Server Panel	1				
		LV Panel	1				
25	Tarlton (MP)	PLC Panel	3				
		Metering Panel	1				
		Server Panel	2				
		LV Panel	3				No IO in LV01
26	Rustenburg	PLC Panel	1		3		3 TOP SIFs
		Metering Panel				1	Panel replaced – micro5000 FEPs
		Server Panel				1	
		LV Panel	1				
27	Witbank	PLC Panel	1		8		8 TOP SIFs
		Metering Panel	1				
		Server Panel				1	
		MV Panel	2	3			2 DOL and 2 ETMs
		LV Panel	1				
31	Secunda	PLC Panel	2		-		
		Metering Panel	1				
		Server Panel				1	
		MV Panel	2	8			8 DOL and 1 ETM
		LV Panel	1				
36	Kendal	PLC Panel	1				
		Server Panel	1				
		LV Panel	1				
37	Meyerton	PLC Panel	1				
		Server Panel				1	
		MV Panel	1	1			1 VSD and 1 ETM
		LV Panel	1				
43	Tarlton-IRP	PLC Panel	1				
		Server Panel				1	

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#	Station	Panel	In Place Replacement	Back-plane replacement	SIS Modifications (Addition of SIL Trip Amps)	New Panel	Notes
		LV Panel	1				
95	School of Pipelines	Server Panel				1	
98	SCC	Server Panel	1				
98	MCC	Server Panel	2				

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Appendix E: Technical Requirements

Equipment detailed as included in the *Works* shall comply with the following requirements:

No.	Equipment	Specification
1	Integrated PCS, CMS, PLMS System Architecture	Integrated PCS, CMS, PLMS System Architecture Redundancy requirements shall include: - Redundant SCADA control at all stations and the MCC with no single point of hardware failure (inclusive of LAN). - Redundant hot standby PLC CPU pair, powered from independent power supplies. - Redundant PLC communication. - Redundant remote IO communications. - Non-redundant IO modules.
2	Integrated PCS, CMS, PLMS System Architecture	Operating system is Microsoft Windows Based
3	Integrated PCS, CMS, PLMS System Architecture	Two operator workstations (clients) shall be provided for all metering stations. The second client shall also serve as an engineering workstation on these sites. One operator workstation (client) shall be provided for unmanned stations, and shall also serve as an engineering workstation on these sites .
4	Integrated PCS, CMS, PLMS System Architecture	HART Communications to instrumentation will not be provided on Control Module faceplates or via HART PLC IO Modules. HART communication to instruments will be provided by means of handheld HART communication devices.
5	Integrated PCS, CMS, PLMS System Architecture	SCADA STORAGE DESIGN PRINCIPLES: There will only be two standard sizes of SSD HD supplied on the server configurations to be finalised in Phase 1. Server Configuration Principals: 1) Operating System drives will be configured RAID 1 2) DATA Drives will be configured RAID 10e 3) SAN will be configured RAID 10e + 1 Hot standby Drive Servers shall be sized for 20% spare capacity in storage.
6	Operator Workstation Screen Resolution	Workstation screens to comply with the following screen resolution: QHD (2560x1440) – OASyS 2018 (Avtur) 4K (3840x2160) – AES202x (Inland MP)
7	PLC and Metering Panels	Shall comply with TPL Specification: PLC, Metering and Server Panel Specification [14] Acceptable suppliers/range: - Sarel Spatial 6000 - Schneider Spacial SF
8	PLC and Metering Panels	Single non-redundant power supplies will be used for PLC CPU and IO power. This is because the increased availability of redundant power supplies is only calculated to be 30min per year.
9	PLC and Metering Panels	SD Cards are to be provided for all PLC CPUs, to ensure quick recovery of software in the event of PLC CPU failure.
10	PLC and Metering Panels	Ruggedised PLC equipment (CPU, IO Modules, racks, power supplies) are to be provided on the following stations that have been identified as being in a corrosive environment: WIR, SEC, KDL

No.	Equipment	Specification
11	PLC, Metering and Panels	32 Ch PLC DI and DO modules shall be standardised on for PLC Panels. 16 Ch PLC DI and DO modules shall be standardised on for Metering, LV and MV Panels. Due to space constraints, TSA Assemblies will NOT be used for Inland Station installations.
12	PLC and Metering Panel Wiring Philosophy	It is expected that engineering and hardware quantities provided in the contract shall comply with the following requirements: - PLC and Metering panels shall comply with TPL specification: PLC, Metering and Server Panel Specification [14]. - Field termination and marshalling shall be located in the rear of the panel. - PLC, IO, power distribution and safety barriers shall be located in the front of the panel. - Field terminals within the PLC panel will be allocated on a per cable basis entering the rear of the panel. Signal termination shall be allocated in the same signal order and grouping as the field. - IO module terminal rails shall be located in the rear of the panel, and interfaced to IO cards located in the front of the panel via pre-manufactured looms. - Cross patching of signals is implemented between the field terminal rails and the IO module terminal rails in the rear of the panels. - Single level terminals are to be used – multi-level terminals shall not be used. - Transorbs shall be used on field wiring terminals. - The <i>Employer's</i> preference is that the panel shall comply with the PLC Panel General Arrangement drawings provided as a receivable.
13	PLC and Metering Panel Power Distribution	Requires the use of 230VAC and 24VDC Circuit Breakers for protection of power distribution. To reduce the number of 24VDC circuit breakers, protection is done on a device group basis.
14	PLC IO Assignment and Grouping Philosophy	It is expected that engineering and hardware quantities provided in the contract shall comply with the following requirements: 25% spare capacity is required for each IO type (AI, AO, DI, DO), to be provided on a per PLC basis. - Where dedicated IO modules are supplied, IO cards in a rack are to be allocated in the order: DI, DO, AI, AO. - Each mainline pumpset IO is to be allocated to dedicated cards. Where possible mainline pumps should be allocated to different racks. - Devices should be ordered on a card in device group order and then sequential tag order. IO quantities listed in the Station PCS Design Basis, ref [32] are actual/used quantities, and do not reflect the above spare and grouping allowances.
15	Metering Flow Computer Assignment and Grouping Philosophy	It is expected that engineering and hardware quantities provided in the contract shall comply with the following requirements: - Flow computer hardware will be allocated on a per stream, per prover basis. - Stream and flow computer assignment within the metering panel shall be done on product assignment basis eg. meter 1, meter 2, crude prover, etc. - Flow Computer AI, DI, DO shall be loomed to terminals in the rear of the panel, including spares. - The <i>Employer's</i> preference is that the panel shall comply with the metering panel General Arrangement drawing and wiring schematic diagram provided as a receivable.
16	Server Panels	The <i>Employer's</i> preference is that the panel shall comply with the Server Panel General Arrangement drawings provided as a receivable.

No.	Equipment	Specification
17	Panel Installation Requirements	- Cabling will enter panels from the bottom. - Panels shall be supported on panel base frames.
18	Fibre Optic Cabling (priced in E&I Installation contract PC Sum)	- Where existing fibre is multi-mode, it shall be retained. - Single mode fibre shall be utilised where communication cabling runs between buildings on a site. Fibre cabling shall be steel wire armoured (SWA) or corrugated sheath tape (CST). - Patch leads shall be ruggedized unless routed within a single tier of a panel. - OTDR testing shall be performed on all cores for all fibre cable links with dB losses not exceeding a loss of 0.05dB.
19	Control Room Furniture (priced in E&I Installation contract PC Sum)	The control desk comprises: 2 x straight units (2m length) 2 x corner units 1 x straight unit (1m length) 1 x under desk drawer cabinet Maintenance desk comprising: 1 x straight unit (2m length) 1 x under desk drawer cabinet Cupboard 1,2m x 385mm deep x 1600mm high with 3 adjustable shelves and locking doors. Desk units shall be manufactured from beech veneer with solid edging, with the bases composed of solid beech composite (superwood). The finish shall be clear satin reaction lacquer. - Four swivel back chairs. mesh high-back, swivel and tilt mechanism, caster, arm rest, nylon base, weight limit 120kg
20	UPS (priced in E&I Installation contract PC Sum)	Shall comply with TPL Specification PL720 Acceptable suppliers: - Eaton (shutdown agent required) - Standard size: 10kVA
21	Instruments (priced in E&I Installation contract PC Sum)	Shall comply with TPL datasheets and installation hook-ups.
22	Tank Gauging Systems	The following Tank Gauging Systems are installed on Transnet Pipeline sites. The PCS/CMS will be required to interface into these systems: - Rosemount Raptor Rader Level TGS with 2410 Hub and an FCU, - SAAB \ Rosemount Rex RTG 3950

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Appendix F: Preliminary Equipment List

The Preliminary Equipment List indicates the quantities of equipment, hardware and license functionality which the *Employer* has identified. The quantities are listed on a per Station and Total basis.

The *Contractor* is required to submit their own Equipment Lists for the *Works*, on a per-Station basis. These quantities and associated pricing should be carried through to the Activity Schedules forming part of the RFP, and submitted as part of their respective Offers.

It is the *Contractor's* responsibility to validate this Equipment List and Preferred Vendor equipment as being suitable for use and to ensure that all equipment is sized and selected to meet all functional and performance requirements.

Appendix F1: Server\Client Equipment

1	Server\Client Equipment	Preferred Supplier		TOTAL	PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP	PLMS
1.1	SCADA Hardware																						
1.1	Server (MCC)	ea	7	2	3																		2
1.1.1	Server (Metering Station)	ea	21					1	2			2	2	2	2	2	2		2	2	2		
1.1.2	Server (Non-Metering Station)	ea	5							1	1							1				2	
1.1.3	Domain Controller	ea	3	1	1	1																	
1.1.4	Operator Workstations	ea	38	4	5	2	2	2	2	1	1	2	2	2	2	2	2	1	2	2	2	2	
1.1.5	SAN Storage - MCC/DSS	ea	1		1																		
1.1.6	SAN Storage - Stations	ea	13	1					1			1	1	1	1	1	1	1	1	1	1	1	
1.1.7	Monitors - 27" QHD	ea	23	12		3			4	2	2												
1.1.8	Monitors – 27" 4K	ea	89		13	3	9					6	6	8	6	6	6	2	6	6	6	6	
1.1.9	KVM Console (1U)	ea	2											1	1								
1.1.10	Printers (LaserJet M454DN or equivalent.)	ea	15	1		1			1	1	1	1	1	1		1	1	1	1	1	1	1	
1.1.11	Active Optical Cables (Rose Electronics)	ea	91		14	0	6	6	6	3	2	6	6	6	6	6	6	3	6	6	6	3	

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1	Server\Client Equipment Preferred Supplier		TOTAL	PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP	PLMS
1.1.12	Video Splitters (Rose Electronics)	ea	5		5																	
1.1.13	USB Extenders (Rose Electronics)	ea	52		14		3	4	1	1	2	2	2	2	2	2	1	6	2	2	6	
1.1.14	VGA Extenders (Rose Electronics)	ea	6		6																	
1.1.15	Audio Amplifier 19"	ea	14					1	1	1	1	1	1	1	1	1	1	1	1	1	1	
1.1.16	Alarm Horn (Outdoor)	ea	14					1	1	1	1	1	1	1	1	1	1	1	1	1	1	

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Appendix F2: Metering Equipment

2	Metering Hardware	Preferred Supplier		TOTAL	PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP
2.1	Emerson S600+ Flow Computer Hardware																					
2.1.1	Floboss S600+ Complete Stream (New) (P152+P144 x 2 + Fabricated metal case+ Removable front panel)	Emerson	ea	13	8				2			3										
2.1.2	Floboss S600+ Complete Prover (New) (P152+P144 x 2 +P154+ Fabricated metal case+ Removable front panel)	Emerson	ea	5	2				2			1										
2.1.3	Floboss S600+ CPU Stream (New) & Faceplate (P152+ Removable front panel)	Emerson	ea	24											7	7				6	4	
2.1.4	Floboss S600+ CPU Prover (New) & Faceplate (P152+ Removable front panel)	Emerson	ea	5											1	1				2	1	
2.1.5	Floboss S600+ CPU Stream (Upgraded) (Update P152 firmware)	Emerson	ea	24									7	4			7		6			
2.1.6	Floboss S600+ CPU Prover (Update P152 firmware)	Emerson	ea	4									1	1			1		1			

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Appendix F3: Networking Equipment

3	Networking Equipment	Preferred Supplier		TOTAL	PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP
3.1	Network Hardware																					
3.1.1	Ethernet Switches (Cisco C9200-24T-4G-E or similar)	Cisco	ea	32	2	2	2		2	2	2	2	2	2		2	2	2	2	2	2	2
3.1.2	SFP Transceiver Modules (Cisco GLC-TE or similar)	Cisco	ea	32	2	2	2		2	2	2	2	2	2		2	2	2	2	2	2	2
3.1.3	Ethernet Switches (Cisco IE3100 12port or similar)	Cisco	ea	20					2			2	2	2	2	2	2		2	2	2	
3.1.4	Firewalls (Fortigate NGFW HA)	Fortigate	ea	1			1															
3.1.5	Schneider Managed Switch - MCSESM063F2CU0 - Multimode	Schneider	ea	51						2			2	6	18	3	2		3	9	6	
3.1.6	Schneider Managed Switch - MCSESM063F2CS0 - Singlemode	Schneider	ea	3											2			1				

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Appendix F4: PLC Hardware

Appendix F4-1 PLC Power Supply and CPU

4	PLC Power Supply and CPU Preferred Supplier		TOTAL	PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP
4.1	PLC Hardware - Power Supply																				
4.1.1	BMXCPS3500: High power AC 110/220 VAC power supply (IO)	ea	153	6				12	5	6	7	11	18	38		12			24	10	4
4.1.2	BMXCPS3500H: High power AC 110/220 VAC power supply (Ruggedised) (IO)	ea	50												16		8	26			
4.1.3	ABL8RPM24200 AC 110/220 VAC power supply (Field) 20A	ea	167	6				14	4	6	9	14	9	39		15			30	16	5
4.1.4	ABL8RED24400 Redundant Power Supply Module	ea	42					3	1	2	3	3	4	9		3			7	5	2
4.1.5	ABL8RPM24200H AC 110/220 VAC power supply (Field) 20A (Ruggedised)	ea	53	6											17		5	25			
4.1.6	ABL8RED24400H Redundant Power Supply Module (Ruggedised)	ea	8												3		2	3			
4.2	PLC Hardware - PLC CPU																				
4.2.1	BMEXBP0800: PLC 8 slots Ethernet backplane	ea	0																		
4.2.2	BMEXBP0800H: PLC 8 slots Ethernet backplane (Ruggedised)	ea	0																		
4.2.3	BMEXBP0400: PLC 4 slots Ethernet backplane	ea	34	4				4	2	2	2	2	4	4		2			4	2	2
4.2.4	BMEXBP0400H: PLC 4 slots Ethernet backplane (Ruggedised)	ea	8												2		2	4			
4.2.5	BMXXEM010: 5 PLC Rack protective covers	ea	251					20	9	12	13	12	20	23	16	11	9	20	29	10	47

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4	PLC Power Supply and CPU Preferred Supplier		TOTAL	PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP
4.2.6	BMEH58x0x0: M580 CPU redundant family with remote and distributed I/O	ea	40	4				4	2	2	2	2	4	4	2	2	2	4	4	2	
4.2.7	BMXRMS004GPF: Memory card SD flash 4 Go for M580 CPU	ea	42	4				4	2	2	2	2	4	4	2	2	2	4	4	2	2
4.2.8	490NAC0100: M580 Redundant link RJ45 SFP	ea	0																		
4.2.9	BMENOC0321: M580 Ethernet module with IP forwarding and with 3 Ports	ea	34	4				4	2	2	2	2	4	4		2			4	2	2
4.2.10	BMENOC0321C: M580 Ethernet module with IP forwarding and with 3 Ports (Ruggedised – Conformal Coating)	ea	8												2		2	4			
4.2.11	BMXNRP0201: Ethernet RIO optical single mode repeater	ea	12											10			2				
4.2.12	BMXNRP0201C: Ethernet RIO optical single mode repeater (Ruggedised - Conformal Coating)	ea	0																		

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Appendix F4-2 Remote IO (Normal)

4.3	Remote IO (Normal)	Preferred Supplier	TOTAL	PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP
4.3	PLC Hardware - PLC Remote IO																				
4.3.1	BMEXBP0800: PLC 8 slots Ethernet backplane	ea	93					4	1	2	5	9	14	19		9			14	7	9
4.3.2	BMEXBP0800H: PLC 8 slots Ethernet backplane (Ruggedised)	ea	27												10		5	12			
4.3.3	BMEXBP0400: PLC 4 slots Ethernet backplane	ea	35	2				4	4	2				15		1			6	1	
4.3.4	BMEXBP0400H: PLC 4 slots Ethernet backplane (Ruggedised)	ea	15												4		1	10			
4.3.5	BMXXEM010: 5 PLC Rack protective covers (incl Above 4.2.5)	ea	0																		
4.3.6	BMECRA31210: X80 Performance Ethernet Drop adapter with Ethernet backplane	ea	127	2				9	3	4	5	9	14	34		10			20	8	9
4.3.7	BMECRA31210C: X80 Performance Ethernet Drop adapter with Ethernet backplane (Ruggedised – Conformal Coating)	ea	42												14		6	22			
4.3.8	BMXNRP0201: Ethernet RIO optical single mode repeater	ea	0																		
4.3.9	BMXNRP0201C: Ethernet RIO optical single mode repeater (Ruggedised - Conformal Coating)	ea	0																		
4.3.10	BMXDDI3202K: 32 Digital 24 VDC positive logic input channels module	ea	190					10	4	3	7	21	38	39		25			23	12	8

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4.3	Remote IO (Normal)	Preferred Supplier		TOTAL	PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP
4.3.11	BMXDDI3202KH: 32 Digital 24 VDC positive logic input channels module (Ruggedised)	ea	60													22		11	27			
4.3.12	BMXFCW501 (32 Ch DDI): 5m pre-equipped cable with 1 x 40 way connector	ea	250						10	4	3	7	21	38	39	22	25	11	27	23	12	8
4.3.13	BMXDDI1602: 16 Digital 24 VDC positive logic input channels module	ea	70	2					2	1	2	3	3	6	24		2			14	11	
4.3.14	BMXDDI1602H: 16 Digital 24 VDC positive logic input channels module (Ruggedised)	ea	30													13		1	16			
4.3.15	BMXFTW501 (16 Ch DDI): 5m pre-equipped cable with 1 x 20 way spring type connector	ea	100	2					2	1	2	3	3	6	24	13	2	1	16	14	11	
4.3.16	BMXDDO3202K: 32 Digital 24 VDC positive logic static output channels module	ea	92						4	1	0		10	17	20		12			15	10	3
4.3.17	BMXDDO3202KC: 32 Digital 24 VDC positive logic static output channels module (Ruggedised - Conformal Coating)	ea	27													10		7	10			
4.3.18	BMXFCW501 (32 Ch DDO): 5m pre-equipped cable with 1 x 40 way connector	ea	119						4	1	0		10	17	20	10	12	7	10	15	10	3
4.3.19	BMXDDO1602: 16 Digital 24 VDC positive logic static output channels module	ea	62	2					4	2	4	10	2	4	18		2			8	6	
4.3.20	BMXDDO1602H: 16 Digital 24 VDC positive logic static output	ea	19													6		1	12			

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4.3	Remote IO (Normal)	Preferred Supplier	TOTAL	PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP
	channels module (Ruggedised)																				
4.3.21	BMXFTW501 (16 Ch DDO): 5m pre-equipped cable with 1 x 20 way spring type connector	ea	81	2				4	2	4	10	2	4	18	6	2	1	12	8	6	
4.3.22	BMXAMI0810: 8 Analog voltage/current input isolated high speed channels module	ea	175	2				11	4	7	6	14	19	50		15			31	7	9
4.3.23	BMXAMI0810H: 8 Analog voltage/current input isolated high speed channels module (Ruggedised)	ea	60												16		8	36			
4.3.24	BMXFTW308S (8 Ch AI): 5m pre-equipped cable with 28 way terminal block connector	ea	235	2				11	4	7	6	14	19	50	16	15	8	36	31	7	9
4.3.25	BMXAMO0410: 4 Analog voltage/current output isolated channels module	ea	27	2				2	1	1	1	3	2	5		2			4	1	3
4.3.26	BMXAMO0410H: 4 Analog voltage/current output isolated channels module (Ruggedised)	ea	9												4		3	2			
4.3.27	BMXFTW501S (4 Ch AO): 5m pre-equipped cable with 20 way terminal block connector	ea	36	2				2	1	1	1	3	2	5	4	2	3	2	4	1	3
4.3.28	BMXEHC0800: High Speed Counter 8 Channels with 10kHz frequency module	ea	26	2						1	1	4	3	7		3			4	1	
4.3.29	BMXEHC0800H: High Speed Counter 8 Channels with 10kHz frequency module (Ruggedised)	ea	8												1		4	3			
4.3.30	BMXFTW501S (8 Ch Counter): 5m pre-equipped cable with 20	ea	32							1	1	4	3	7	1	3	4	3	4	1	

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4.3	Remote IO (Normal)	Preferred Supplier		TOTAL	PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP
	way terminal block connector																					
4.3.31	BMXFTB2010: 20-way removable terminal block with screw clamp (16 ch, DI)	ea		2	2																	

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Appendix F4-3 Remote IO (Safety)

4.4	Remote IO (Safety)	Preferred Supplier		TOTAL	PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP
4.4	PLC Hardware - Safety Rated																					
4.4.1	BMXCPS4002S: High power, redundant AC 110/220 VAC power supply	ea	7																			7
4.4.2	BMEP582040S + BMEP58CPRO3: M580 CPU redundant family 40 with remote and distributed I/O, plus Coprocessor	ea	3	1																		2
4.4.3	BMXSDI1602: 16 Digital Safety 24 VDC positive logic input channels module (SIL3)	ea	7	1																		6
4.4.4	BMXFTB2010 (16 Ch DI Safe): 20 way screw clamp terminal block	ea	7	1																		6
4.4.5	BMXSDO0802: 8 Digital Safety 24 VDC 0.5A positive logic static output channels module (SIL3)	ea	12	1																		11
4.4.6	BMXSRA0405: 4 Isolated Digital Safety 24 VDC 5A positive logic static output channels module (SIL2)	ea	0																			
4.4.7	BMXFTB2010 (8 Ch DO Safe): 20 way screw clamp terminal block	ea	12	1																		11
4.4.8	BMXSAI0410: 4 Analog Safety current Input isolated channels module	ea	11	1																		10
4.4.9	BMXFTB2010 (4 Ch AI Safe): 20 way screw clamp terminal block	ea	11	1																		10

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Appendix F4-4 Isolator and Barriers

4.5	Isolator and Barriers	Preferred Supplier		TOTAL	PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP
4.5	Instrument Safety Isolators/Barriers																					
4.5.1	KFD2-CRG2-Ex1.D: Trip Amplifier (SIL 1)	P&F	ea	27					2	1	1	3			10	8			2			

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Appendix F5: Panel Supply Equipment

5	Panel Supply Equipment	Preferred Supplier		TOTAL	PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP
5.1	Panel Supply																					
5.1.1	PLC Panel Supply	Lot	1						1													
5.1.2	Remote PLC Panel Supply	Lot	0																			
5.1.3	Metering Panel Supply	Lot	2						1			1										
5.1.4	Server Panel Supply	Lot	9		1				1	1	1	1				1			1	1		1
5.1.5	Test Panel Supply	Lot	1		1																	
5.1.5	Electrical MV ET Panel Supply	Lot	26								1				8	3			8	6		

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Appendix F6: OASyS 2018 Licensed Functionality Supply (Licenses are required to be provided for new Functionality)

6	OASyS 2018 Functionality Supply	Preferred Supplier		TOTAL	PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP	PLMS
6.1	NOC-MCC (OASyS SCADA - Enterprise Edition)																						
6.1.1	Realtime Services – Hot	Lot																					
6.1.2	Realtime Services – Standby	Lot																					
6.1.3	Historical App Services – Hot	Lot																					
6.1.4	Historical App Services – Standby	Lot																					
6.1.5	Named Client License	Lot	X				X																
6.1.6	Engineering Station - Incl all required Services	Lot																					
6.1.7	OASyS Enterprise OPC Server	Lot																					
6.1.8	Playback Services	Lot																					
6.1.9	OASyS Reporting Services	Lot																					
6.2	NOC-DSS (OASyS SCADA - Enterprise Edition)																						
6.2.1	Pipeline Operations – Liquids – Decision Support Environment (incl Reporting)	Lot	X			X																	
6.3	STATION (OASyS SCADA - Enterprise Edition)																						
6.3.1	Station OASyS – Hot	Lot	X						X	X	X												
6.3.2	Station OASyS – Standby	Lot	X						X														
6.3.3	Engineering Station - Incl all required Services	Lot	X						X	X	X												
6.3.4	Named Client License	Lot	X						X	X	X												
6.3.5	OASyS Reporting Services	Lot	X						X	X	X												

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6	OASyS 2018 Functionality Supply	Preferred Supplier	TOTAL	PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP	PLMS
6.4	HMI TRAINER (OASyS SCADA - Enterprise Edition)																					
6.4.1	Station OASyS - Administrator	Lot																				
6.4.2	Engineering Station - Incl all required Services	Lot																				
6.4.3	Named Client License	Lot																				
6.4.4	Historical Database Server	Lot																				
6.4.5	OASyS Reporting Services	Lot																				
6.5	CUSTODY METERING (OASyS SCADA - Enterprise Edition)																					
6.5.1	Pipeline Operations - Liquids – Flow Computer Management (FCM)	Lot	X					X														
6.5.2	Pipeline Operations - Liquids – BTM connector to Flow Computer Management	Lot	X					X														
6.5.3	Pipeline Operations - Liquids – Tank Management Application	Lot																				
6.6	PIPELINE MONITORING																					
6.6.1	Pipeline Operations – Liquids – Leak Detection	Lot	X																			X
6.6.2	Pipeline Operations – Liquids – Batch Tracking	Lot																				
6.6.3	Pipeline Operations – Liquids – Theft Detection	Lot																				
6.6.4	Pipeline Operations – Liquids – Pig Tracking	Lot																				
6.7	PLC Licenses																					
6.7.1	Control Expert XL Entity Licence	Lot	X					X	X	X												

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Appendix F7: AES202x Licensed Functionality Supply

7	AES202x Licensed Functionality Supply	Preferred Supplier		TOTAL	PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP	PLMS
7.1	NOC-MCC (AES202x SCADA - Enterprise Edition)																						
7.1.1	Realtime Services – Hot	Lot	x		x	x																	
7.1.2	Realtime Services – Standby	Lot	x		x	x																	
7.1.3	Historical App Services – Hot	Lot	x		x	x																	
7.1.4	Historical App Services – Standby	Lot	x		x	x																	
7.1.5	Named Client License	Lot	x		x	x																	
7.1.6	Engineering Station - Incl all required Services	Lot	x		x	x																	
7.1.7	AES202x Enterprise OPC Server	Lot	x		x	x																	
7.1.8	Playback Services	Lot	x		x	x																	
7.1.9	AES202x Reporting Services	Lot	x		x	x																	
7.2	NOC-DSS (AES202x SCADA - Enterprise Edition)																						
7.2.1	Pipeline Operations – Liquids – Decision Support Environment (incl Reporting)	Lot	x		x	x																	
7.3	STATION (AES202x SCADA - Enterprise Edition)																						
7.3.1	Station AES202x – Hot	Lot	x									x	x	x	x	x	x	x	x	x	x	x	
7.3.2	Station AES202x – Standby	Lot	x									x	x	x	x	x	x		x	x	x	x	
7.3.3	Engineering Station - Incl all required Services	Lot	x									x	x	x	x	x	x	x	x	x	x	x	
7.3.4	Named Client License	Lot	x									x	x	x	x	x	x	x	x	x	x	x	

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7	AES202x Licensed Functionality Supply	Preferred Supplier		TOTAL	PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP	PLMS
7.3.5	AES202x Reporting Services	Lot	x									x	x	x	x	x	x	x	x	x	x	x	
7,4	HMI TRAINER (AES202x SCADA - Enterprise Edition)																						
7.4.1	Station AES202x - Administrator	Lot	x					x															
7.4.2	Engineering Station - Incl all required Services	Lot	x					x															
7.4.3	Named Client License	Lot	x					x															
7.4.4	Historical Database Server	Lot	x					x															
7.4.5	AES202x Reporting Services	Lot	x					x															
7,5	CUSTODY METERING (AES202x SCADA - Enterprise Edition)																						
7.5.1	Pipeline Operations - Liquids – Flow Computer Management (FCM)	Lot	x									x	x	x	x	x	x		x	x	x		
7.5.2	Pipeline Operations - Liquids – BTM connector to Flow Computer Management	Lot	x									x	x	x	x	x	x		x	x	x		
7.5.3	Pipeline Operations - Liquids – Tank Management Application	Lot	x											x									
7,6	PIPELINE MONITORING																						
7.6.1	Pipeline Operations – Liquids – Leak Detection	Lot	x																				x
7.6.2	Pipeline Operations – Liquids – Batch Tracking	Lot	x																				x
7.6.3	Pipeline Operations – Liquids – Theft Detection	Lot	x																				x
7.7.4	Pipeline Operations – Liquids – Pig Tracking	Lot	x																				x
7,7	PLC Licenses																						

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7	AES202x Licensed Functionality Supply	Preferred Supplier		TOTAL	PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP	PLMS
7.7.1	Control Expert XL Entity Licence		Lot	x	x			x				x	x	x	x	x	x	x	x	x	x	x	

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Appendix F8: Additional Services

5	Panel Supply Equipment	Preferred Supplier		TOTAL	PH1 STAGE	NOC	SCC	HMI TRN	APT	MTN	ALR AV	RTR	LLA	TLR	ALR MP	WIR	WAO	KDL	SEC	SBG	KRP	IRP
8.1	OPC Bridge																					
8.1.1	OPC Bridge Software	ea	1			1																
8.1.2	OPC Bridge Software (Upgrade)	ea	1			1																
8.2	Diagnostic Tools																					
8.2.1	ACRONIS Backup Tool	ea	16			1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8.2.2	Microsoft Extra ID Diagnostics Audit Tool	ea	1			1																

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Appendix G: Preferred Vendor List

This list is the equipment that the Employer currently uses and would like to standardised on.

The *Contractor* to required validate that this equipment is sufficient and suitable for the *Works*, and to ensure that all equipment is sized and selected to meet all functional and performance requirements.

Table G-1: SCADA Hardware

No.	Category	Supplier	Make/Model	Description
1	Server	IBM\Lenovo	ThinkSystem Enterprise Class 2U Server	
2	Operator Workstations	IBM\Lenovo	19" Rack Mount	
3	SAN	Lenovo Storage	ThinkSystem	
4	Monitors	Lenovo	ThinkVision	27-inch-Wide QHD IPS \ 4K
5	Console (KVM)	Lenovo		1U 18.5" Standard Console
6	Printers	Hewlett Packard	LaserJet M454DN or similar	
7	Active Optical cables	Rose Electronics	AVP-D4AMAM or similar	AOC 30m
8	Video Splitters	Rose Electronics	VSP-1x2DP/4K60 or similar	
9	USB Extenders	Rose Electronics	CLK-4U2TPB-100M or similar	
10	VGA Extenders	Rose Electronics	VLK-TMVURAVU or similar	

Table G-2: Networking

No.	Category	Supplier	Make/Model	Description
1	Ethernet Switches	CISCO	C9200-24T-4G-E or later	19" Rack Mount
2	Ethernet Switches	CISCO	Catalyst IE 3100 or later	DIN Rail Mount
3	SFP Transceiver Module	CISCO	GLC-TE	
4	Firewalls	Fortigate	Fortigate NGFW HA	

Table G-3: PLC Software Licenses

No.	Category	Supplier	Make/Model	Description
1	STATION	Schneider	100 User Licence	Control Expert XL Entity Licence

Table G-4: PLC Hardware

No.	Category	Supplier	Make/Model	Description
PLC HARDWARE				
1	Power Supply	Schneider Electric	BMXCPS3500	High power AC 110/220 VAC power supply

No.	Category	Supplier	Make/Model	Description
2		Schneider Electric	BMXCPS3500H	High power AC 110/220 VAC power supply (Ruggedised)
3	PLC CPU	Schneider Electric	BMEXBP0400	PLC 8 slots Ethernet backplane
4		Schneider Electric	BMEXBP0400H	PLC 8 slots Ethernet backplane (Ruggedised)
5		Schneider Electric	BMXXEM010	5 PLC Rack protective covers
6		Schneider Electric	BMEH58xxxx	M580 CPU redundant family 40 with remote and distributed I/O – <i>Contractor</i> to advise on Sizing.
7		Schneider Electric	BMXRMS004GPF	Memory card SD flash 4 Go for M580 CPU
8		Schneider Electric	490NAC0100	M580 Redundant link RJ45 SFP
9		Schneider Electric	BMENOC0321	M580 Ethernet module with IP forwarding and with 3 Ports
10		Schneider Electric	BMENOC0321C	M580 Ethernet module with IP forwarding and with 3 Ports (Ruggedised – Conformal Coating)
11		Schneider Electric	BMXNRP0201	Ethernet RIO optical single mode repeater
12	PLC Remote IO	Schneider Electric	BMEXBP0800	PLC 8 slots Ethernet backplane
13		Schneider Electric	BMEXBP0800H	PLC 8 slots Ethernet backplane (Ruggedised)
14		Schneider Electric	BMEXBP0400	PLC 4 slots Ethernet backplane
15		Schneider Electric	BMEXBP0400H	PLC 4 slots Ethernet backplane (Ruggedised)
16		Schneider Electric	BMECRA31210	X80 Performance Ethernet Drop adapter with Ethernet backplane
17		Schneider Electric	BMECRA31210C	X80 Performance Ethernet Drop adapter with Ethernet backplane (Ruggedised – Conformal Coating)
18		Schneider Electric	BMXNRP0201	Ethernet RIO optical single mode repeater
19		Schneider Electric	BMXDDI3202K	32 Digital 24 VDC positive logic input channels module
20		Schneider Electric	BMXFCW301 (32 Ch DDI)	3m pre-equipped cable with 1 x 40 way connector
21		Schneider Electric	BMXDDI1602	16 Digital 24 VDC positive logic input channels module
22		Schneider Electric	BMXDDI1602H	16 Digital 24 VDC positive logic input channels module (Ruggedised)
23		Schneider Electric	BMXFTW301 (16 Ch DDI)	3m pre-equipped cable with 1 x 20 way spring type connector

No.	Category	Supplier	Make/Model	Description
24		Schneider Electric	BMXDDO3202K	32 Digital 24 VDC positive logic static output channels module
25		Schneider Electric	BMXFCW301 (32 Ch DDO)	3m pre-equipped cable with 1 x 40 way connector
26		Schneider Electric	BMXDDO1602	16 Digital 24 VDC positive logic static output channels module
27		Schneider Electric	BMXDDO1602H	16 Digital 24 VDC positive logic static output channels module (Ruggedised)
28		Schneider Electric	BMXFTW301 (16 Ch DDO)	3m pre-equipped cable with 1 x 20 way spring type connector
29		Schneider Electric	BMXAMI0810	8 Analog voltage/current input isolated high speed channels module
30		Schneider Electric	BMXAMI0810H	8 Analog voltage/current input isolated high speed channels module (Ruggedised)
31		Schneider Electric	BMXFTW308S (8 Ch AI)	3m pre-equipped cable with 28 way terminal block connector
32		Schneider Electric	BMXAMO0410	4 Analog voltage/current output isolated channels module
33		Schneider Electric	BMXAMO0410H	4 Analog voltage/current output isolated channels module (Ruggedised)
34		Schneider Electric	BMXFTW301S (4 Ch AO)	3m pre-equipped cable with 20 way terminal block connector
35		Schneider Electric	BMXEHC0800	High Speed Counter 8 Channels with 10kHz frequency module
36		Schneider Electric	BMXEHC0800H	High Speed Counter 8 Channels with 10kHz frequency module (Ruggedised)
37		Schneider Electric	BMXFTW301S (8 Ch Counter)	3m pre-equipped cable with 20 way terminal block connector
38		Schneider Electric	BMXFTB2010	20-way removable terminal block with screw clamp (16 ch, DI)
SAFETY RATED (SIL) PLC HARDWARE				
39	Power Supply	Schneider Electric	BMXCPS4002S	High power, redundant AC 110/220 VAC power supply
40	PLC CPU	Schneider Electric	BMEP582040S + BMEP58CPROS3	M580 CPU redundant family 40 with remote and distributed I/O, plus Coprocessor
41	PLC Remote IO	Schneider Electric	BMXSDI1602	16 Digital Safety 24 VDC positive logic input channels module (SIL3)
42		Schneider Electric	BMXFTB2010 (16 Ch DI Safe)	20 way screw clamp terminal block

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No.	Category	Supplier	Make/Model	Description
43		Schneider Electric	BMXSDO0802	8 Digital Safety 24 VDC 0.5A positive logic static output channels module (SIL3)
44		Schneider Electric	BMXSRA0405	4 Isolated Digital Safety 24 VDC 5A positive logic static output channels module (SIL2)
45		Schneider Electric	BMXFTB2010 (8 Ch DO Safe)	20 way screw clamp terminal block
46		Schneider Electric	BMXSAI0410	4 Analog Safety current output isolated channels module
47		Schneider Electric	BMXFTB2010 (4 Ch AI Safe)	20 way screw clamp terminal block

Table G-5: Metering Hardware

No.	Category	Supplier	Make/Model	Description
S600+ HARDWARE				
48	S600+ CPU	Emerson	Floboss S600 P152 Fabricated metal case+ Removable front panel)	Requirements: Changes to the Stream (P136) and Prover (P137) applications required to incorporate Network Printing, additional changes to the CPU Kernel and Binary.app firmware. New applications generated: Stream (P496) and Prover (P497), All CPU Boards had their kernel upgraded to June 2016 and binary.app 06.26b installed.
49	S600+ Front Panel	Emerson	Floboss S600+ Removable front panel	
50	S600+ IO Card	Emerson	Floboss S600+ P144	
51	S600+ Prover Card	Emerson	Floboss S600+ P154	
FIELD				
52	Pulse Amplifier	Stercon	SE106 + SE100A (pickup)	

Table G-8: Instrument Safety Isolators/Barriers

No.	Category	Supplier	Make/Model	Description
1	Digital Inputs	P&F	HiD2844	Switch Amplifier - 4 Channel Isolator
2	Analog Inputs	P&F	HiD2022	Smart Transmitter Power Supply - 2 channel isolated barrier
3	Mainline Pump Vibration	MTL	µZ779	Zener barrier 2-channel
4	Metering	MTL	Z-961	Zener barrier 2-channel
5	Termination Board	P&F	HiDTB08-SCT-99C-SC-RA	Termination Board for 8 channels
6		P&F	HID2000	Place Holder barrier
7	Safety Instrumented Loop	P&F	KFD2-CRG2-Ex1.D	Trip Amplifier (SIL 1)

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Appendix H: Deliverable Document Objective and Content

The required objective and relevant content of deliverable documentation is detailed below:

No.	Objective	Objective	Content/Description
1	Data Pack	Provide a single reference for specification of an entity.	A dossier or collection of documents which in combination provide the total specification related to an item or area of work.
2	DDS (Detailed Design Specification)	Provide a single reference for specification of a hardware component (e.g. JB, Panel, equipment)	Data Pack of hardware design documents, including: - Detailed panel/JB GA's and drawings - Single Line Drawings - Power Distribution Drawings (panel, instrument, 24V 220V etc) - Termination Schedules - Circuit Breaker Allocations - Network Topologies (Profibus, Ethernet etc.) - Wiring Schematics - Hardware Architecture - IO Lists
3	EDS (Engineering Design Specification)	Provide a comprehensive specification for the automation of a station. Used by software developers, maintenance and trainer.	Comprehensive document detailing: - Device Groups and associated instrumentation, valves and equipment. - Functionality of each device group - Interlocks - Sequences and sequence availability - Alarms and events - Failure modes
4	FDS (Functional Design Specification)	Provide a comprehensive specification for a system (e.g. PCS, metering, Tank gauging) including all system hardware and software functionality.	Comprehensive document detailing: - Functionality of the system and each sub-system - Configuration options of each sub-system - Details of all internal and external communication - Details of all known failure modes - Details of software and hardware component make-up - Identification and details of all interfaces - Reporting, User interfaces, standards and other aspects of the system.
5	Style Guide	Provide a consistent HMI framework for all systems	Comprehensive document detailing: - Standard Fonts and sizes - Standard colours and their usage - Standard windows controls - User interface concepts including click behaviour, pop-ups etc. - Navigation Standards - HMI Typographical standards - Numbering and Naming standards - Graphic labelling and naming standards - Implementation guidelines

No.	Objective	Objective	Content/Description
6	ICD (Interface Control Document)	Provide a specification which details the interface requirements and expectations between two systems.	Comprehensive document consisting of two parts: System Standard Interface - Physical interface requirements - Software structure requirements (e.g. Modbus TCP/IP) - Software functionality Requirements Site Specific Interface - Site Specific implementation of the System Standard interface (e.g. Modbus Map)
7	Station Equipment Configuration Specifications and Records	Provide sufficient information to be able to trouble shoot a system and rebuild a configuration if necessary.	A site specific document detailing the configuration of the system detailed in the FDS for a specific site. The document includes: ICD documents if not separate document System Configuration including: - Controller configuration - Switch/firewall configuration including rules, routing etc - Computer setup and configuration - Site software configurations per system, server, workstation as required - Addressing (IP, Profibus, Modbus etc) - Any other configuration which is required to be able to rebuild the system.
8	Software Suite of Documents	Refer to the Software Lifecycle Requirements Specification.	
9	Materials Management Schedule	Tracking of Equipment and Software Licensing Location and Status	A schedule that tracks the movement of equipment and software licensing, including: Equipment/License Model/Serial Number Date of relocation Location/Site/Computer Status of equipment, incl. - Installed - Faulty - Stores

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Appendix I: Quality Assurance and Control Requirements

1. General Requirements

This Attachment describes the minimum requirements of the *Contractor's* Quality Control System for this *Works* Information. The planning, inspections, tests and related actions specified in this section and elsewhere in the Contract are not intended to limit the *Contractor's* own quality assurance/control procedures that facilitate overall compliance with requirements of the Contract. The *Contractor* uses its own QA/QC procedures after such procedures have been reviewed and accepted by the *Project Manager* prior to start of work. The *Contractor's* procedures addresses, as a minimum, the requirements referenced in this attachment.

- a. The *Contractor* performs all quality related activities as specified in ISO 9001:2008 "Quality Management System", or equivalent, acceptable to the *Employer*.
- b. The *Contractor* provides the necessary quality management systems to ensure that the quality of the *works* complies with the requirements of the *Works Information*.
- c. The *Employer* reserves the right to review certified material test reports for all materials of construction at any time during field erection. The *Contractor* maintains these documents readily available for such review and submits all documents to the *Employer* on completion of the *works*.
- d. The *Contractor's* performance of his obligations under the Contract is not deemed complete until the *Project Manager* is in receipt, on proper forms, of all Technical Data and other documents to be submitted to the *Project Manager* as part of the *Contractor's* work. Failure of the *Contractor* to comply with the Quality requirements entitles the *Employer* to withhold any progress payment, or final payment, pending the *Project Manager's* receipt of all the above data without prejudice to any other remedy of the *Employer*.
- e. If a standardised mark programme for any Plant and Material is implemented, all such material supplied bears the official standardisation mark.
- f. All software and materials proposed by the *Contractor* for incorporation into the *works* are tested in accordance with the required specifications. All test results are submitted to the *Project Manager* for approval prior to such software and materials being built into the *works*. No material is built into the *works* without such approval.
- g. The *Contractor* provides and maintains sufficient Equipment to meet all contractual requirements and does not remove any of this Equipment from the site without the written permission of the *Project Manager*. The *Contractor* removes unsuitable, obsolete or worn-out Equipment from the site when ordered to do so by the *Project Manager*.
- h. The approval of any Equipment on the Site by the *Project Manager* does not relieve the *Contractor* of any of his obligations under the Contract.

1.1 Project Quality Control Plan

- a. The *Contractor* formally submits a comprehensive Project Quality Plan (PQP) for review and approval by the *Project Manager*.
- b. The PQP is specifically tailored to the requirements of this Contract, and covers the full scope, including software design and development.
- c. The *Contractor's* PQP shall:
 - i. Detail the *Contractor's* organization indicating how the project will be staffed;
 - ii. Detail the interface with the *Contractor's* Quality Management System and applicable documents, procedures and work instructions;

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- iii. Detail the *Contractor's* design review and verification requirements for this Contract;
- iv. Detail the *Contractor's* inspection requirements for this Contract, including all Critical Design Reviews, Factory and Site Tests and other special processes, hold points, witness and observation points, material control and traceability, cleaning and preservation, material storage and transport;
- v. Detail quality controlling procedures;
- vi. Detail specific acceptance criteria, showing specific codes, standards and specification references, and definition of achievable tolerances;
- vii. List major sub-ordered items, sub-vendors, including their quality programme and level of supplier source inspection of sub-ordered material. The *Contractor* ensures that approved Sub-contractors are capable of performing the required work/service;
- viii. Identify inspection documentation used for the recording of inspection functions, special processes, non-conformance release and acceptance reports, and qualification of inspection/test personnel; and
- ix. Contain an inspection schedule plan, showing level of inspection or surveillance.
- d. The *Project Manager* and/or the *Supervisor* monitors the quality management system, as his own needs dictate, and reserves the right to audit any of the quality systems and processes throughout the life cycle of the project.
- e. The *Contractor* is required to develop and implement an internal quality audit plan covering the scope of work, and shall include the *Contractor's* sub-contractors.
- f. The *Employer's* or other inspection bodies as may be appointed by the *Employer*, is granted unrestricted access to all parts of the *Contractor's*, or its sub-contractor's work.
- g. For installation and construction, the *Contractor* designates an on-site Quality Supervisor to administer the *Contractor's* approved quality program and to ensure compliance with all the requirements of this Contract.

1.2 Quality Control Program

- a. Basic objectives of the *Contractor's* Quality Control (QC) System are as follows:
 - i. To ensure that work adheres strictly to requirements of the Contract and governing agencies where the work is being performed.
 - ii. To maintain QC procedures to ensure that tasks performed will comply with the Contract.
 - iii. To prevent deficiencies through pre-construction quality control coordination.
 - iv. To detect and correct deficiencies in a timely manner.
 - v. To provide an auditable record of tests, inspections, procedures, noncompliance and corrections, and any other pertinent data as required.
 - vi. Verify compliance with the *Contractor's* QC procedures, including those QC procedures of sub-contractors and suppliers.
 - vii. To provide a basis of measuring *Contractor's* performance for input to Company Contractor Resource Database.
- b. The *Contractor* may select either an outside "agency" or in-house personnel to administer the *Contractor's* QC System. In either case, the *Contractor's* on-site Quality Control staff is only responsible for Quality Control. The QC Supervisor (or person designated as the QC Representative) reports directly to the *Contractor's* Site Manager.

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- c. The *Contractor's* QC staff is not involved in the management and/or control of the construction process. The *Contractor's* QC staff members interface with the *Project Manager* as required.

1.3 Guarantees

The *Contractor* guarantees that:

- a. The *Contractor* supplies appropriate and suitable skills to provide the *works* in accordance with this Works Information.
- b. The *works* strictly complies with the provisions of this Contract and all specifications and drawings referred to in the Works Information or afterwards furnished by the *Employer/Project Manager*.
- c. The *works* is first class in every particular and free from Defects in construction and workmanship and in any design and engineering furnished by the *Contractor*.
- d. All design and engineering supervision that forms part of the *works* is performed in accordance with sound engineering practice and standards of skill and care practiced by recognised engineering firms in performing similar work.
- e. All Plant and Material are new, merchantable, of the most suitable grade and fit for their intended purposes.
- f. All Equipment which is used on the site is in first class operating condition, safe, fit for its intended use and suitable for safe and efficient performance of the *works*.

1.4 Samples

- a. Where samples are required, they are submitted by and at the expense of the *Contractor*. Such submittals are made not less than thirty calendar days prior to the time that the materials represented by such samples are needed for incorporation into the *works*. Samples are subject to the *Project Manager's* review and materials represented by such samples are not to be manufactured, delivered to the site or incorporated into any work without such review.
- b. Each sample bears a label showing the *Contractor's* name, project name, name of the item, manufacturer's name, brand name, model number, supplier's name and reference to the appropriate drawing, technical specification section and paragraph number, as applicable.
- c. Reviewed samples may, at the *Project Manager's* discretion, be returned to the *Contractor* for incorporation into the *works*.

1.5 Testing Criteria

- a. The *Contractor* performs testing and inspection of *works* (including Plant and Materials) both on and off site as required by the Contract.
- b. Criteria for acceptance are specified in the Contract.

1.6 QC Agencies - Selection and Qualification

- a. Where applicable, inspectors employed by the *Contractor's* Inspection and Testing Agency are specially qualified to perform required inspection services for the particular classification of work to be inspected and are certified as required by the Contract or governing agencies where the work is being performed.

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1.7 Responsibilities of the *Contractor's* QC Supervisor (Representative)

Responsibilities and duties of the *Contractor's* QC Supervisor are:

- a. To communicate these minimum QC requirements to any suppliers and/or sub-contractors.
- b. To have the authority to stop work for cause, reject work, order work removed, initiate remedial work, propose solutions, and reject material not in compliance with the Contract.
- c. Be present on-site during working hours and assigned "full time" to this Contract. The *Contractor* designates alternate individual(s) to assume responsibilities in the temporary absence of the QC Supervisor.
- d. Be completely familiar with the Contract Works Information, Drawings and Specifications.
- e. Establish and implement QC Programs for the *Contractor* and with its various sub-contractors, and monitor their conformance.
- f. Inspect existing conditions prior to the start of new work segments.
- g. Conduct a pre-construction quality control meeting with the *Contractor's* responsible field and office representatives prior to the start of each major item of work required by the Contract.
- h. Perform in-process and follow-up inspections on each of the work segments to ensure compliance with the Contract. Upon request, accompany the *Project Manager/Supervisor* on such inspections.
- i. Coordinate required test, inspections, and demonstrations with *Project Manager/Supervisor* any other authority having jurisdiction. Assure work is accessible for test or inspection.
- j. Inspect the *Contractor's* purchased Plant/Materials and equipment arriving at the Site to ensure conformance to the requirements of the Contract. Prepare and submit documentation as required by the Contract.
- k. Inspect material "free-issued" to the *Contractor* by the *Employer* to ensure conformance to the requirements of the Contract. The *Contractor* provides immediate notification to the *Project Manager/Supervisor* when Plant and Materials are found to be damaged or nonconforming.
- l. Identify, report and reject defective work not in conformance with the Contract. Monitor the repair or reconstruction of rejected work and document corrective action, including remedial action taken to prevent the re-occurrence of the defective Work.
- m. If necessary, retain specialists or sub-contractors for inspection of work in areas where additional technical knowledge is required (mechanical, electrical, electronics, controls, communications, welding, structural, etc.). Submit qualifications of sub-contractors and specialists to the *Project Manager/ Supervisor* for approval.
- n. Schedule and accompany the *Project Manager/Supervisor* on any Site visits when requested.
- o. Work closely with the *Project Manager/Supervisor* to ensure optimum Quality Control.
- p. Attend meetings as required by the *Project Manager/Supervisor*.
- q. Coordinate completion and handover of quality records and end-of-job documentation to the *Project Manager/Supervisor*.

1.8 Submittals

- a. The *Contractor* submits reports detailing the results of each test and describing each inspection. Submit separate reports for each test and inspection procedure immediately upon completion of each procedure and test.
- b. General QC Requirements, Inspection and test reports, as a minimum, include:

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- i. Date issued
- ii. Date of inspection or test
- iii. Project title and number
- iv. Testing agency name and address
- v. Name and signature of the inspector/tester
- vi. Identification of the product and applicable specification section
- vii. Type inspection or test
- viii. The results as related to requirements

1.9 Inspection, Measuring and Test Equipment

- a. The *Contractor* provides and maintains measuring and testing devices.
- b. Laboratory devices are calibrated as required by Contract.
- c. The standards against which the measurement equipment is periodically calibrated have their accuracy verified directly by, or through a precise comparison with standards traceable to the National Institute of Standards and Technology or to a recognised national or international standard.

1.10 Execution

The *Contractor's* inspection is adequate to cover operations, including both on-site and off-site and is keyed to the proposed sequence of the work and include as a minimum at least four (4) phases of inspection for definable items or segments of the *works*, as follows:

- a. Preparatory Inspection:
 - i. Performed prior to beginning any work on any definable segment of the *works* and include:
 - A review of Contract requirements
 - Verification that Plant and Materials have been tested, submitted, and accepted
 - Verification that provisions have been made to provide required control testing
 - Examination of the work area to ascertain that preliminary work has been completed
 - A physical examination of Plant and Materials to assure that they conform to accepted shop drawings or submittal data and that necessary material and/or equipment are available.
 - ii. As a part of this preparatory work, the *Contractor's* organisation reviews and verifies that documents, including but not limited to, shop drawings, submittal data, method of Quality Control, product data sheets, test reports, affidavits, certification and manufacturer's instructions have been submitted and accepted by the *Project Manager/Supervisor* as required herein.
 - iii. Each submittal to *Project Manager/Supervisor* bears the date and the signature of the *Contractor's* Quality Control Manager (or authorised designee) indicating that a review of the submittal and certify it to be in compliance with the Contract Drawings and Specifications or showing the required changes.
- b. Initial Inspection:
 - i. Performed as soon as a representative segment of the particular item of work has been accomplished and to include an examination of the quality of workmanship and a review of control testing for compliance with Contract requirements, an exclusion of defective or damaged Plant and Materials, omissions and dimensional requirements.

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- c. Follow-up Inspection:
 - i. Performed daily or more frequently as required.
 - ii. Performed to ensure contentious compliance with the Contract requirements and includes control testing until completion.
- d. Final Inspection:
 - i. Performed when the work is substantially completed.
 - ii. The *Contractor* inspects the *works* for quality, workmanship and completeness prior to notification that the item or segment of the *works* has been completed.
- e. Specific tests and inspection procedures (including documentation) for each material or item of work are specified in the Contract.
- f. The *Contractor's* Testing Laboratory performs tests according to method(s) of testing specified in the Contract.
- g. Where the specifications or applicable codes stipulate that a material shall conform to the American Society for Testing Materials (A.S.T.M.) specifications or other recognised standards, the *Contractor* delivers a material certificate to the *Project Manager/Supervisor*, signed by the manufacturer or supplier that the material furnished conforms to the specifications or standards mentioned. When tests are required, the results of such tests are delivered to the *Project Manager/Supervisor* at no additional cost.
- h. The *Contractor* ensures that work not complying with the requirements and references specified in the Works Information is identified and correctly dispositioned. All *works* installed or fabricated by the *Contractor* are inspected (i.e., punched) and resolved prior to notifying the *Project Manager/Supervisor* that the *works* are ready for final acceptance inspection. The *Contractor* records punch list items (i.e. deficiencies, anomalies) on a punch list record. Material or equipment that is supplied by the *Employer* and is found by *Contractor* to have defects is immediately identified to the *Project Manager/Supervisor* for corrective action.
- i. The *Contractor* does not render any work as inaccessible until inspections and tests have been completed and accepted by involved parties, including the *Project Manager/Supervisor* and the *Employer*. Any work that is rendered inaccessible prior to inspection and test by involved parties may be made accessible for inspection and test at the *Contractors* expense.
- j. The *Contractor* packages and prepares inspection and testing documentation for turnover at the completion of construction and commissioning. The *Contractor* develops turnover packages, by system as determined or mutually agreed by the *Project Manager/Supervisor*. Each system file contains field inspection and testing records for the components of the system.
- k. Unless otherwise specified, the *Contractor* submits the original and as a minimum two (2) clean, legible copies of turnover packages to the *Project Manager/Supervisor* at construction and commissioning completion or as determined necessary by the *Project Manager/Supervisor*.

1.11 Co-ordination of Tests and Inspections

- a. The *Contractor* initiates, schedules, and coordinates test and inspections. The *Contractor* coordinates the sequence of the work so as to accommodate required tests and inspections. When inspection or testing is performed on a sampling basis (less than 100 percent), the *Project Manager/Supervisor* selects the items to be inspected or tested. The *Project Manager/Supervisor* inspects, or has inspected at source, supplies or services not manufactured or performed on the Site. Such inspection does not constitute acceptance;

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nor does it in any way relieve the *Contractor* of responsibility to furnish required Quality Assurance/Control.

- b. The *Contractor* provides a minimum of 7 days notice to the *Project Manager/Supervisor* unless otherwise agreed to witness tests and re-inspect work performed by the *Contractor*.
- c. The *Project Manager/Supervisor* monitors construction and quality activities of the *Contractor*. The *Project Manager/Supervisor* performs auditing of documentation to verify correctness of data, completeness of coverage, retrievability, timeliness of scheduling, and action taken on inspection and testing results.
- d. The *Contractor* schedules and accompanies the *Project Manager/Supervisor* on any site visits when requested, works closely with the *Project Manager/Supervisor* to ensure optimum quality, and attend meetings on quality issues as required by the *Project Manager/Supervisor*.
- e. The *Contractor* receives approval of the *Contractor's* testing and inspection Agencies from the *Project Manager/Supervisor* prior to them performing any inspections and tests. The *Contractor's* testing and inspection agencies provide reports simultaneously to the *Contractor* and the *Project Manager/Supervisor*.
- f. The *Contractor* and sub-tier suppliers and sub-contractors are subject to a qualification survey by the *Project Manager/Supervisor* prior to the start of activities required by the contract to verify implementation of the required Quality Programs.
- g. Acceptance of the *Contractor's* Quality Program by the *Project Manager/Supervisor* does not relieve the *Contractor* of the obligation to comply with requirements of the Contract including the requirements herein. If the Quality Program is subsequently found to be ineffective or inadequate in providing acceptable control, the *Project Manager/Supervisor* requires necessary revisions.

2. QC Procedures Description

- a. The *Contractor* implements the measures necessary to achieve and document compliance to specified requirements and the Contract.
- b. The inspections, tests, and related actions specified in this section and elsewhere in the Contract are not intended to limit the *Contractor's* own quality assurance/control procedures, which facilitate overall compliance with requirements of the Contract.
- c. This section provides a brief description to the *Contractor* of the procedures that are to be developed by the *Contractor*.

2.1 Document Control

- a. The *Contractor* prepares procedures to control documents and data that relate to the control of the *works*.
- b. The *Contractor* ensures that documents provided by the *Project Manager/Supervisor* are maintained to the most up-to-date revisions.
- c. The *Contractor's* control procedure ensures that necessary information is delivered to the proper locations and personnel responsible for the performance of the *works*.
- d. The procedure ensures that obsolete documents are promptly removed from points of issue or use.

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2.2 Identification and Traceability of Equipment and Material

- a. The *Contractor* maintains the identification of software, material and equipment used during construction and commissioning. Procedures are developed to describe the methods of maintaining traceability.

2.3 Process Control

- a. The *Contractor* provides procedures to control work processes. These include the following:
 - i. Welding Procedure Specifications and Procedure Qualification Records
 - ii. Flushing and hydro-testing procedures
 - iii. NDE (Non-destructive Examination) Procedures
 - iv. Welder Qualification Procedures
 - v. PWHT (Post Weld Heat Treatment)
- b. When personnel certifications are required, they are made available upon request.

2.4 Software Development Lifecycle

- a. The *Contractor* formally submits an SLCP for review and approval by the *Project Manager*.
- b. The SLCP complies with the requirements of [19].
- c. The SLCP covers all software *works*.
- d. The *Contractor* provides procedures to software work processes.
- e. For all sections of the software *works*, the *Contractor* presents the *Project Manager* with Quality Control Plans (QCPs) that:
 - i. Are consistent with the approved SLCP;
 - ii. Identify all the tasks/steps pertaining to the *works* section;
 - iii. Identify the quality control points pertaining to the *works*;
 - iv. Identify the quality control controlling procedures and documents; and
 - v. Identify the roles and responsibilities of the *Contractor* and *Employer* insofar as the quality control hold points.
- f. The *Contractor* signs off all quality hold points during the *works* execution.
- g. For all of the software *works*, the *Contractor* designates a competent software development lead engineer to administer the *Contractor's* approved quality and SLCP program and to ensure compliance with all the requirements of this Contract.
- h. The *Contractor* formally submits a Software Configuration Management Plan (SCMP) for review and approval by the *Project Manager*, and manages the configuration of all *works* systems and software in accordance with the plan.

2.5 Inspection, Measuring and Test Equipment

- a. The *Contractor* provides and maintains measuring and test devices used to verify compliance to specifications.
- b. The *Contractor* provides a procedure for controlling calibration of this equipment. The procedure will specify the intervals and standards against which test and measurement equipment are checked.
- c. The standard against which the measurement equipment is calibrated has accuracy traceable to a recognised industrial or national standard. Where no such standards exist,

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the basis used for calibration is documented. This equipment bears a record of the calibration and record of use logs is maintained.

- d. The *Contractor's* measuring and test equipment is made available for use by the *Project Manager/Supervisor* for verification of their accuracy and condition as well as inspection and test monitoring.

2.6 Control of Non-Conformances

- a. The *Contractor* develops procedures for control and disposition of nonconforming conditions. Measures are taken to preclude work containing uncorrected deficiencies being built upon or concealed until satisfactorily dispositioned. The *Contractor* prepares procedures for documenting and controlling nonconforming items or services. If corrective action of the *Contractor* does not result in full conformance with contract requirements, the proposed final disposition is approved by the *Project Manager/Supervisor*.
- b. Measures are taken to perform the following:
 - i. Provide holding areas or methods for segregating nonconforming items to prevent unauthorised use.
 - ii. Maintain records identifying nonconforming items, the nature of non-conformance, its dispositions, and evidence that the disposition has been satisfactorily completed.
- c. The *Project Manager/Supervisor* also may identify and report non-conformances. In these cases, a non-conformance report is delivered to the *Contractor* who provides for appropriate closure action.

2.7 Quality Control Records

- a. The *Contractor* prepares procedures to collect, index, file, store, maintain, and turn over to the *Project Manager/Supervisor* the quality control records listed below:
 - i. All records required by specifications
 - ii. Test and inspection reports
 - iii. Software test reports
 - iv. Radiographs
 - v. Material and equipment certificates required by specification
 - vi. Equipment maintenance/preservation records
 - vii. As-built drawings
- b. The *Contractor* packages and prepares quality records for turnover. Timing of this is compatible with the *Project Manager/Supervisor* document control system. Turnover packages are developed by *works* systems/sections as determined by the *Project Manager/Supervisor*. Each system/*works* section file contains field inspection and testing records for the components of the system/*works* section. Unless otherwise specified, the *Contractor* submits the original and 1 clean, legible copy of turnover packages to the *Project Manager/Supervisor* at the construction and commissioning completion.

2.8 Training

- a. The *Contractor* prepares a procedure for identifying training needs, and provides for the training of personnel performing activities affecting quality.
- b. The procedure provides for documentation of training.
- c. In addition to other training needs identified by the *Contractor*, prior to the start of each major item of work required by the Contract, a Quality Control meeting with responsible

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individuals, field and office representatives is conducted to ensure that quality requirements are understood by those performing the work.

2.9 Material and Equipment Receiving, Handling, Storage, and Maintenance

- a. The *Contractor* receives and controls its purchased material and equipment and the *Employer's* material and equipment that are issued to the *Contractor*. The *Contractor* may reject faulty or damaged equipment upon receipt, and promptly advises the *Project Manager/Supervisor* of such material/equipment.
- b. The *Contractor* prepares a procedure for material and equipment receiving, handling, storage, and maintenance.
- c. The *Contractor*, where required:
 - i. Stores material and equipment in accordance with supplier recommendations; and
 - ii. Conducts a program for preventive maintenance of equipment in accordance with supplier recommendations, and keeps record of maintenance performed on the equipment.

2.10 Sub-contractor/Supplier Quality Requirements, Qualification, Surveillance and Audit

- a. The *Contractor's* suppliers of services, equipment, and materials are required to meet the same quality standards required of the *Contractor*.
- b. The *Contractor* performs surveillance of other lower-tier sub-contractor's and supplier's quality related operations consistent with the nature and scope of service or product provided.
- c. The *Contractor* provides a procedure for controlling quality of the sub-tier suppliers/sub-contractors.

2.11 Quality Control Plans

- a. Two weeks prior to the start of a section of the *works*, or earlier if required by the contract schedule, the *Contractor* submits Quality Control Plans (Also known as Inspection and Test Plans [ITPs]) to the *Project Manager/Supervisor* for approval.
- b. The purpose of the QCP is for the *Contractor* to describe in one document the inspection and testing activities for each definable feature of work.
- c. QCPs are developed for all sections of the *works*.
- d. As a minimum the QCPs address the quality control requirements of the contractual requirements, specifications, and drawings, as well as the standards and codes referred to therein. However, these requirements are not considered exclusive, the *Contractor* being responsible for adding to these minimum requirements to the extent that the *Contractor* considers necessary to obtain appropriate quality levels.
- e. The QCPs:
 - i. Are consistent with the approved PQP;
 - ii. Identify all the tasks/steps pertaining to the *works*;
 - iii. Identify the quality control points pertaining to the *works* (i.e. Review, Witness, Hold points);
 - iv. Identify the quality control activities (i.e. Inspection, Test);
 - v. Identify the quality controlling procedures and documents; and

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- vi. Identify the roles and responsibilities of the *Contractor* and *Employer* insofar as the quality control hold points and activities.
- f. Once the QCP has been approved by the *Project Manager/Supervisor*, the *Contractor* applies it. Any modification must have the written approval of the *Project Manager/Supervisor*.
- g. The *Contractor* signs off all quality hold points during the *works* execution.
- h. Definitions associated with QCPs:
 - i. Inspection: Visual checks of a qualitative nature but also including dimensional measurements
 - ii. Tests: Measured verifications of one or more characteristics or of performance, both being carried out to ascertain whether or not the specified requirements have been met.

3. **Inspection and/or Testing by the *Project Manager/Supervisor***

- a. The *Contractor* requests inspections of the *works* by the *Employer* or governmental agencies through the *Project Manager*, only after the *works* is ready for inspection.
- b. All *works* hardware, software and equipment are subject to Factory Acceptance Testing (FAT) and release by the *Project Manager*, prior to delivery to site.
- c. For all inspections and tests, including FATs and SATs, the *Contractor* provides an inspection and/or test procedure to the *Project Manager* for approval, prior to the inspection and test activities taking place.
- d. Notification is given to the *Project Manager/Supervisor* to enable them to be present at the Hold and Witness points nominated by the *Project Manager/Supervisor* on the QCPs.
- e. The *Contractor* is responsible for quality and for implementing the measures necessary to achieve compliance to specified requirements.
- f. The *Contractor* ensures that the *Project Manager/Supervisor* is given sufficient time per the notice periods set forth in this Attachment to witness tests and re-inspect work performed by the *Contractor*.
- g. When inspection reveals work not conforming to requirements, the *Contractor* is informed and performs the work necessary to achieve compliance. For all non-conformances (defects) notified by the *Project Manager/Supervisor*, the resultant corrections are reviewed and approved by the *Project Manager/Supervisor*.
- h. The *Contractor* has the primary responsibility for quality. The *Contractor* implements the measures necessary to build quality into the work in accordance with the Contract, drawings, and specifications. Inspection of the *Contractor's* work by the *Project Manager/Supervisor* does not relieve the *Contractor* of the obligation to comply with requirements of the Contract.

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Appendix J: TPL Site Locations

No.	Station	Abbr	Longitude	Latitude	Address
16	Sasolburg	SBG	27.85072616	-26.82585624	Cnr Henry & Bergius Street, Sasolburg, 1947
17	Coalbrook	CBK	27.85702586	-26.79728718	cnr Jan Haak Rd & Main Entrance Natref, Sasolburg, 1947
18	Alrode	ALR	28.11996991	-26.29804068	35 Garfield Street, Alberton
20	Klerksdorp	KRP	26.66351275	-26.89745511	9A Mahogany Avenue, Klerksdorp Industrial, Klerksdorp
21	Airport	APT	28.23846310	-26.16579451	90 Springbok/Jones Road, Jet Park, Boksburg, 1459
22	Waltloo	WAO	28.31505693	-25.72583092	274 Alwyn Street, Waltloo, Pretoria, 0184
24	Langlaagte	LLA	27.97527025	-26.20491863	42 Main Reef Rd, Industria, Langlaagte, 2091
25	Tarlton	TLR	27.64046629	-26.07937652	Cnr Rustenburg/Ventersdorp (R24/N14), Tarlton
26	Rustenburg	RTR	27.25694813	-25.67364687	6 Escom Street, Rustenburg, 0299
27	Witbank	WIR	29.16643836	-25.86294002	9 Schoonland Drive, Ferrobank, Witbank, 1034
31	Secunda	SEC	29.14369479	-26.58960740	Behind SASOL, Brandspruit Mine, Secunda
36	Kendal	KDL	28.96949958	-26.00811325	Road to Hoogland Boerdery adjacent to Alpha Mine, Kendal
37	Meyerton	MTN	28.11481032	-26.57814435	off Bloemendale Rd, Meyerton, Henley on Klip.
43	Tarlton IRP	TLR	27.64046629	-26.07937652	Cnr Rustenburg/Ventersdorp (R24/N14), Tarlton
98	Secondary Control Centre	SCC	31.02903415	-29.85833170	202 Anton Lembede (Smith) Street, Durban, 4001
99	National Operating Centre	NOC	30.85157412	-29.81291018	10A Kirk Road, Pinetown
	Transnet Academy (Pinetown)		30.85370	-29.81610	10B Kirk Road, Pinetown

END OF APPENDIX