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:

THE PROVISION OF ENGINEERING AND CONSTRUCTION MANAGEMENT SERVICES (ECM) FOR THE INLAND NETWORK AUTOMATION PROJECT FOR A PERIOD OF SIX (6) YEARS

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 NEC3 PSC *Consultant* 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 Not Applicable – Task Order Based**
Value Added Tax @ 15% is	**R Not Applicable – Task Order Based**
The offered total of the Prices inclusive of VAT is	**R Not Applicable – Task Order Based**
(in words) (**R Not Applicable – Task Order Based)**	

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 *NEC3 PSC Consultant* 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 .....

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 *Consultant* 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 Services

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 and *conditions of contract* 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 of award of contract. Unless the tenderer (now the *NEC3 PSC Consultant*) 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 (Ltd)	
Name & signature of witness		Date

Schedule of Deviations

No.	Subject	Details
1	.....	.....
2	.....	.....
3	.....	.....
4	.....	.....
5	.....	.....
6	.....	.....
7	.....	.....

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		

C1.2 Contract Data

Part one - Data provided by the *Employer*

Clause	Statement	Data
1	**General**	
	The *conditions of contract* are the core clauses and the clauses for main Option	
		G: **Term contract**
	dispute resolution Option	**W1:** **Dispute resolution procedure**
	and secondary Options	
		X1: **Price adjustment for inflation**
		X2 **Changes in the law**
		X7: **Delay damages**
		X9: **Transfer of rights**
		X10 ***Employer*'s *Agent***
		X18: **Limitation of liability**
		Z: ***Additional conditions of contract***
		Z1: ***Obligations in respect of Joint Venture Agreements***
		Z2: ***Additional Obligations in respect of Termination***
		Z3: ***Right Reserved by the Employer to Conduct Vetting through SSA***
		Z4: ***Additional Clause relating to Employer's rights to take appropriate action***
		Z5: ***Protection of Personal Information Act***
		Z6: ***Time***
		Z7: ***Compensation Events***
		Z8: ***Limitation of Liability***
		Z9: ***Additional Clauses related to cession of rights***
		Z10: ***Additional Clauses related to interpretation of the law***

		Z11: ***Employer's Step-in rights***
		Z12: ***Intellectual Property***
		Z13: ***Assignment and Waiver***
		Z14: **Obligations in respect of *Delay Damages***
	of the NEC3 Professional Services Contract (June 2005) (amended June 2006 and April 2013)	
10.1	The *Employer* is (Name):	**Transnet SOC Ltd**
	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 Lembede Street** **Durban** **4001**
11.2(9)	The *services* are	**PROFESSIONAL SERVICES CONTRACT FOR THE INLAND NETWORK AUTOMATION PROJECT**
11.2(10)	The following matters will be included in the Risk Register	**All matters notified in accordance with Clause 15.1.**
11.2(11)	The Scope is in	**Part C3.1: The Scope of the Contract Document**
12.2	The *law of the contract* is the law of	**The Republic of South Africa subject to the jurisdiction of the Courts of South Africa.**
13.1	The *language of this contract* is	**English**
13.3	The *period for reply* is	**2 (two) weeks**
13.6	The *period for retention* is	**5 (five) years following Completion or earlier termination.**

2 The Parties' main responsibilities

25.2	The *Employer* provides access to the following persons, places and things	**access to**		***access date***
		1	**TBA**	**TBA**

3 Time

31.2	The *starting date* is	**29 September 2023**

11.2(3)	The *completion date* for the whole of the *services* is	**06 September 2029 (Anticipated)**		
11.2(6)	The *key date*s and the *condition*s to be met are:	***Condition* to be met**		***key date***
		1	**Completion of Bankable Feasibility Phase *Works***	**26 January 2024**
		2	**Completion of Execution Phase 1 – Development *Works***	**30 December 2024**
		3	**Completion of Execution Phase 2A Handover**	**28 April 2025**
		4	**Completion of Execution Phase 2B Handover**	**26 May 2026**
		5	**Completion of Execution Phase 2C Handover**	**22 June 2027**
		6	**Completion of Execution Phase 2D Handover**	**15 February 2028**
		7	**Completion of Execution Phase 2E Handover**	**08 March 2029**
		8	**Completion of Execution Phase 2F Handover**	**16 August 2029**
		9	**Completion of Project Closeout Activities**	**06 September 2029**
31.1	The *Consultant* is to submit a first programme for acceptance within	**2 (two) weeks of the Contract Date.**		
32.2	The *Consultant* submits revised programmes at intervals no longer than	**4 (four) weeks.**		
4	**Quality**			
40.2	The quality policy statement and quality plan are provided within	**2 (two) weeks of the Contract Date.**		
41.1	The *defects date* is	**52 weeks after Completion of the whole of the *service*s.**		
5	**Payment**			
50.1	The *assessment interval* is on the	**18th day of each successive month.**		
50.3	The *expenses* stated by the *Employer* are	**Item**		**Amount**
		Economy air fares		**Charged at proven costs strictly on limits as set out in National Treasury Instructions as amended from time to time.**

		Car hire not exceeding group B	**Charged at proven costs strictly on limits as set out in National Treasury Instructions as amended from time to time.**
		Accommodation	**Charged at proven costs strictly on limits as set out in National Treasury Instructions as amended from time to time.**
51.1	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.**	
51.2	The *currency of this contract* is the	**South African Rand (ZAR).**	
51.5	The *interest rate* is	**The prime lending rate of Rand Merchant Bank of South Africa.**	
6	**Compensation events**	**No additional data required for this section of the *conditions of contract*.**	
7	**Rights to material**	**No additional data required for this section of the *conditions of contract*.**	
8	**Indemnity, insurance and liability**		
81.1	The amounts of insurance and the periods for which the *Consultant* maintains insurance are		
	Event	**Cover**	**Period following Completion of the whole of the *service*s or earlier termination**
	failure by the *Consultant* to use the skill and care normally used by professionals providing services similar to the *service*s	**Professional Indemnity insurance for not less than R10 000 000.00 (Ten Million Rand) in respect of each claim, without limit to the number of claims**	**52 Weeks**

	death of or bodily injury to a person (not an employee of the *Consultant*) or loss of or damage to property resulting from an action or failure to take action by the *Consultant*	**General Third Party Liability Insurance for all amounts falling within the excess of the policy, currently R50 000.00 (Fifty Thousand Rand) each and every claim, and/or for all amounts in excess of the policy limits as detailed in the policy document or whatever the *Consultant* deems desirable in respect of each claim, without limit to the number of claims**	**52 Weeks**
	death of or bodily injury to employees of the *Consultant* arising out of and in the course of their employment in connection with this contract	**The minimum limit of indemnity for insurance in respect of death of or bodily injury to employees of the *Consultant* arising out of and in connection with this contract for any one event is that which is prescribed by the Compensation for Occupation Injuries and Diseases Act No. 130 of 1993 as amended.**	**52 Weeks**
	Motor Vehicle Liability Insurance	**Comprising (as a minimum) "Balance of Third Party" Risks including Passenger Liability Indemnity for an amount of not less than R 10 000 000.00**	
81.1	The *Employer* provides the following insurances	**Professional Indemnity insurance in respect of failure of the *Consultant* to use the skill and care normally used by Professionals providing services similar to the *services*** **General Third Party Liability cover in respect of death of or bodily injury to a person (not an employee of the *Consultant)* or loss of or damage to property resulting from an action or failure to take action by the *Consultant***	

82.1	The *Consultant*'s total liability to the *Employer* for all matters arising under or in connection with this contract, other than the excluded matters, is limited to	***For all matters covered under the Employer's Professional Indemnity (PI) and General Third Party Liability policies, the Consultant's liability will be limited to the excesses applicable under the Employer's Professional Indemnity and General Third Party Liability policies as detailed in the policy wordings. The current excesses amounts to R5 000 000.00 (Five Million Rand) PI and R50 000.00 (Fifty Thousand Rand) General Third Party Liability, respectively, each and every claim. For all matters not covered under the Employer's Professional Indemnity and General Third Party Liability policies the Consultants liability will be limited to the final total of the Prices.***
9	**Termination**	**Refer to Z Clause Z2: Additional Obligations in respect of Termination.**
10	**Data for main Option clause**	
G	**Term contract**	
21.4	The *Consultant* prepares forecasts of the total Time Charge and *expenses* at intervals no longer than	**4 weeks.**
11	**Data for Option W1**	
W1.1	The *Adjudicator* is	**Both parties will agree to an *Adjudicator* as and when a dispute arises. If the parties cannot reach an agreement on the *Adjudicator*, the Chairman of the Association of Arbitrators (Southern Africa) will appoint an *Adjudicator.***
W1.2(3)	The A*djudicator nominating body* is:	**The Association of Arbitrators (Southern Africa)**
W1.4(2)	The *tribunal* is:	**Arbitration**
W1.4(5)	The *arbitration procedure* is	**The latest addition of the South African Rules for the Conduct of Arbitrations of the Association of Arbitrators (Southern Africa)**
	The place where arbitration is to be held is	**Durban**
	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**	

X1	**Price adjustment for inflation**	
X1.1	The *index* is	**The index published in the Table 1 for all expenditure groups (historical metropolitan areas) in the Consumer Price Index (CPI) published by Statistics South Africa.**
	The *staff rates* are	**Defined in Part C2: Pricing Data**
X2	**Changes in the law**	
X2.1	The *law of the project* is	**The law of the Republic of South Africa subject to the jurisdiction of the Courts of South Africa**
X7	**Delay damages**	
X7.1	Delay damages for late Completion of the whole of the *services* are	**Refer to Z Clause Z14: Obligations in respect of Delay Damages.**
X9	**Transfer of rights**	**The *Employer* owns the *Consultant* rights over any of the material whatsoever prepared for the Services of this Contract by the *Consultant*. The *Consultant* provides on request by the *Employer's Agent,* all documentation in whatever form as required (native's, PDF's, CD's, etc) and all other material items which transfer these rights to the *Employer*.**
X10	**The *Employer's Agent***	
X10.1	The *Employer's Agent* is	
	Name:	**Neresh Thoolsiram**
	Address	**Transnet Pipelines 202 Anton Lembede Street Durban 4001**
	The authority of the *Employer's Agent* is	**Fully empowered to act on behalf of the *Employer for* the services covered by the contract.**
X18	**Limitation of liability**	
X18.1	The *Consultant's* liability to the *Employer* for indirect or consequential loss is limited to:	**Nil**
X18.2	The *Consultant's* liability to the *Employer* for Defects that are not found until after the *defects date* is limited to:	**The cost of correcting the defect (The Total of the Prices)**
X18.3	The *end of liability date* is	**1 (One) year after Completion of the whole of the *services*.**

Z	***Additional conditions of contract***
	The *additional conditions of contract* are

Z1	**Obligations in respect of Joint Venture Agreements**	
Z1.1		Insert the additional core clause 21.5 21.5.1 In the instance that the *Consultant* is a joint venture, the *Consultant* 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 *starting 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 constituents' 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 liability to the *Employer* to Provide the *services*; ii. proof of separate bank account/s in the name of the joint venture; iii. identification of the leader in the joint venture confirming the authority of the leader to bind the joint venture through the *Consultant's* representative; iv. Identification of the roles and responsibilities of the constituents to provide the *services*. • Financial requirements for the Joint Venture: i. 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; ii. the names of the auditors and others, if any, who will provide auditing and accounting services to the Joint Venture
Z1.2		Insert additional core clause 21.6 21.6. The *Consultant* shall not alter its composition or legal status of the Joint Venture without the prior approval of the *Employer*.
Z2	**Additional obligations in respect of Termination**	
Z2.1		The following will be included under core clause 90.1: 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 • repudiated this Contract
Z2.2		*Clause 90.5 is added as an additional clause* Where all or part of the Services are suspended for a period of six months or more either party may terminate the Contract by notifying the other.

Z3	**Right Reserved by the *Employer* to Conduct Vetting through SSA**	
Z3.1		The *Employer* reserves the right to conduct vetting through State Security Agency (SSA) for security clearances of any *Consultant* 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.
Z4	**Additional Clause Relating to the *Employer's* rights to take appropriate action**	
Z4.1	**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.
Z4.1.1		The *Consultant* 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.
Z 4.1.2		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.
Z4.1.3		The *Consultant's* breach of this clause constitutes grounds for terminating the *Consultant's* obligation to Provide the Services or taking any other action as appropriate against the *Consultant* (including

		civil or criminal action). However, lawful inducements and rewards shall not constitute grounds for termination.
Z4.1.4		If the *Consultant* 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 *Consultant* (including civil or criminal action).
Z4.2	**The contract award is made without prejudice to any rights the *Employer* may have to take appropriate action later with regard to:**	Politically Exposed Persons including any allegations with regards to State Capture.
Z4.3	**The contract award is made without prejudice to any rights the *Employer* may have to take appropriate action later with regard to:**	Blacklisting by any State Entity on the National Treasury database.
Z5	**Protection of Personal Information Act**	
Z5.1		The *Employer* and the *Consultant* are required to process information obtained for the duration of the Contract in a manner that is aligned to the Protection of Personal Information Act.
Z6	**Time**	
Z6.1		*Clause 33.2. is added as an additional clause.* The *Employer* may at any time suspend part or all of the *services*. As a consequence, if the *Consultant* is required to demobilise and then remobilise its staff and equipment, the *Consultant* will be reimbursed at cost. The *Consultant* 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.
Z7	**Compensation Events**	
Z7.1		Clause 61.4: The first bullet point is amended to read as follows: arises from the fault, error, negligence or default of the *Consultant*.

Z8	**Limitation of liability**	
Z8.1		Add to core clause 82.1 and X18 For the avoidance of doubt the parties expressly agree that the total liability of the *Consultant* to the *Employer* applies jointly and severally across all organisations comprising of the *Consultant*.
Z9	**Additional clauses relating to cession of rights**	
Z9.1		The *Consultant* shall not cede any rights under this contract without the approval of the *Employer*.
Z9.2		The *Employer* may on written notice to the *Consultant* 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 *Employer.*
Z10	**Additional clauses relating to interpretation of the law**	
Z10.1		Add to core clause 12.3 Any extension, concession, waiver or relaxation of any action by the Parties, the *Employers' Agent* or *Adjudicator* 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.
Z11	***Employer's* Step in rights**	
Z11.1		If the *Consultant* 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 *Employer's Agent*, the *Employer*, 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 *sub-consultant* or supplier of the *Consultant*) to do so on his behalf. The reasonable costs of such remedial works shall be borne by the *Consultant*.

Z11.2	The *Consultant* 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 *Consultant* 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.
Z12 *Intellectual Property*	
Z12.1	All project deliverables including but not limited to; reports, tender documents, contract documents, electronic documents and data, and other project and all technical related documents, including copy rights, prepared and furnished by the *Consultant* shall become the property of Transnet Pipelines upon completion of the various Phases of the project, completion and acceptance of the *Consultant's* work or upon termination of the contract. The *Consultant* shall have no claim for further employment or additional compensation as a result of this contract requirement.
Z12.2	The *Consultant* hereby grants to Transnet Pipelines a non-exclusive licence 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 *Consultant* in connection with the works; • 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 *Consultant*; and; • To provide copies thereof to others (third party contractors or consultants of *Transnet*) to be used by them for purposes of tendering, consultancy or service delivery.
Z12.3	The *Consultant*, furthermore, shall cause any specialist and/or firm employed by him for investigation or for design in connection with the Project, to grant to Transnet Pipelines a similar non-exclusive licence for the purposes set out herein. No separate or extra payment shall be due by Transnet Pipelines in respect of any non-exclusive licence granted in terms of this clause.

Z12.4		The source codes of computer programmes designed and developed for Transnet Pipelines by the *Consultant* shall be the sole property of Transnet Pipelines, and Transnet Pipelines has the right to copy and alter code without obtaining permission of the *Consultant*. No portion of the completed system shall be available as commercial value for any party besides Transnet Pipelines. After completion of such software, and prior to final payment the *Consultant* will forward a copy of the data code with all documentation.
Z13	***Assignment and Waiver***	
Z13.1		No rights, duties or liabilities under this contract may be ceded, assigned, transferred, conveyed or otherwise disposed of by either Party (*Employer* or *Consultant*) without the prior written consent of the other Party (*Employer* or *Consultant*), which consent shall not be unreasonably withheld.
Z13.2		No grant by the *Consultant* or the *Employer* to the other of any concession, waiver, condonation, or allowance is, in respect of any specific event or circumstance other than of which the grant was made, to constitute a waiver of the rights of the grantor in terms of the Contract or an *estoppel* of the grantor's right to enforce the provisions of the Contract.
Z14	***Obligations in respect of Delay Damages***	
	Delay damages for late Completion will be levied on a sectional completion basis, based on the Key Dates listed in Section 11.2(6) of the Contract Data. Delay damages for late Completion of the *services* are as follows: **1.** Completion of Bankable Feasibility Phase *Works* ***2.*** Completion of Execution Phase *Works*	 R 5 000.00 per day R 10 000.00 per day The parties agree that this constitutes a genuine pre-estimate of the damages.

C1.2 Contract Data

Part two - Data provided by the *Consultant*

The tendering consultant is advised to read both the NEC3 Professional Services Contract (April 2013) and the relevant parts of its Guidance Notes (PSC3-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 151 to 159 of the PSC3 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 *Consultant* is (Name): Address Tel No. Fax No.	
22.1	The *Consultant's key person*s are: 1 Name: Job: Responsibilities: Qualifications: Experience: 2 Name: Job Responsibilities: Qualifications: Experience:	
Info.		**CV's (and further *key persons* data including CVs) are appended to Tender Schedule entitled……..**
11.2(3)	The *completion date* for the whole of the *services* is	
11.2(10)	The following matters will be included in the Risk Register	
11.2(13)	The *staff rates* are:	**name/designation rate** Contained in Part C2: Pricing Data

25.2	The *Employer* provides access to the following persons, places and things	**access to**	***access date***
		1	
		2	
		3	
31.1	The programme identified in the Contract Data is		
50.3	The *expenses* stated by the *Consultant* are	**item**	**amount**

G	**Term contract**
11.2(25)	The *task schedule* is in

PART C2: PRICING DATA

Document reference	Title	No of pages
C2.1	Pricing instructions: Option G	5
C2.2	Pricing Schedule	1

C2.1 Pricing assumptions: Option G

C2.1.1 Pricing Instructions

1) The *Consultant* shall be paid under Option G (Term Service) for services performed.
2) The staff rates are the prices charged for staff and shall include for all the costs to the *Consultant*, including basic salary, any additional payments or benefits and social costs, overhead charges incurred as part of normal business operations including the cost of management, as well as payments to administrative, clerical and secretarial staff used to support professional and technical staff in general and not on a specific project only.
3) The total annual cost of employment of a person is the total amount borne by the *Consultant* in respect of the employment of such a person per year, calculated at the amounts applicable to such a person at the time when the services are rendered, including basic salary, or a nominal market related salary, fringe benefits not reflected in the basic salary, including normal annual bonus; *Employer's* contribution to medical aid; group life insurance premiums borne by the *Consultant*; the *Consultant's* contribution to a pension or provident fund; and all other benefits or allowances payable in terms of a letter of appointment, including any transportation allowance or company vehicle benefits, telephone and / or computer allowances, etc; and amounts payable in terms of an Act.
4) The amount due or payable at each assessment date shall be based on the tasks and/or milestones completed as indicated on the task schedule. The terms under clause 11 in the NEC3 Professional Services Contract (PSC), April 2013, under main Option G shall be followed. The staff rates shall include all direct and indirect costs, overheads, profits, risks, liabilities, obligations, etc. relative to each Task and excluding VAT.
5) The Tasks listed by the Employer under the Task Schedule are the minimum Tasks acceptable. The Task Schedule work breakdown structure is compiled to the satisfaction of the Employer and additions deemed necessary as part of the project shall be accepted and payable at staff rates. The Task shall be deemed complete when the Consultant has done all the work which the Task Order requires him to do by the Task Completion Date, and corrected Defects which would have prevented the Employer or Others from using the services and from doing their work.
6) The hourly rates for salaried professional or technical staff shall not exceed that payable professionally qualified responsible for carrying out the service.
7) The hourly rates for salaried staff include all protective clothing and all standard equipment.
8) The *staff rate* for casual labour shall include the provision of all protective clothing.
9) Payment to a director or member not providing strategic guidance in planning and executing a project or performing quality management checks shall be paid under another relevant category.
10) The staff rates derived from the Pricing Schedule exclude value added tax.
11) The staff rates when staff travelling more than 1,5 hours from their normal place to or from a jobsite (or vice versa) shall be reduced.

C2.1.2 Expenses

1) A subsistence allowance is an amount intended to cover incidental costs incurred by reason of living away from home, such as the cost of meals, liquid refreshments, phone calls, internet access, laundry and job-related out of pocket expenses that are not paid for in terms of the contract.
2) A subsistence allowance may only be claimed in respect of each night that a staff member is away from home.
3) Travel expenses may only be claimed in respect of the cost of transportation of the Consultant's staff from their usual place of business to the jobsite, and return from the jobsite to Consultant's usual place of business.
4) All air travel shall be in economy class on a scheduled airline.

5) Accommodation means a

   a) bed and breakfast;

   b) guest house;

   c) self catering; or

   d) hotel having a star rating of 1, 2 or 3

   as defined by the Tourism Grading Council of South Africa (see www.tourismgrading.co.za).

   Note: A lodge, country house or 4 star or higher star rated hotel is not accommodation. Any stay in such a facility cannot be claimed as an expense.

6) Breakfast not included in accommodation is not an expense as it falls under the subsistence allowance.

7) A hired car means a motor vehicle having an engine capacity of not more than 1600cc.

   Note: A hired car having an engine capacity greater than 1600cc is not a hired car and cannot be claimed as an expense.

C2.2 Pricing Schedule

This section can be used when the *staff rates* and *expenses* are considerable in number and more conveniently located here than in the Contract Data. Entries in the Contract Data should refer to this section of Part 2.

Remember to state whether the *staff rates* and *expenses* exclude or include VAT.

Pricing Schedule

The *Employer's* Pricing Schedule may be found in Appendix F of the Tender Documentation. The *Consultant* must complete the attached spread sheet (Appendix F) in Excel format.

The Pricing Schedule indicates the minimum deliverables which the *Employer* has identified. The pricing schedule includes an estimate of the total number of hours for each identified deliverable (column C). *Consultants* are required to enter contract hourly rates that will apply to each identified project resource listed in the schedule (row 5). *Consultants* are then required to enter an estimate of the number of hours for each identified project resource required to complete each deliverable, ensuring that the total man hour estimate per deliverable equates to that stipulated in the Hours Total column (col C). These estimates will be used for pricing evaluation purposes and if no alternate offer is provided, will also form the basis of the *Consultant's* Offer.

Consultants should take note, when completing the Pricing Schedule, of the Payment Basis to be applied (lump sum or time-based) to each deliverable by the *Employer*.

Should the *Consultant* wish to submit an alternate Offer; based on revised deliverables, different project resources or total manhour estimates, taking into consideration previous experience and their view of the project; *Consultants* may do so by recording the submission in the Schedule of Deviations. The Consultant's alternate Offer shall not be used for pricing evaluation, but will form the basis of the *Consultant's* Offer.

Staff rates and expenses table

Consultants must list the rates for resources that shall form part of the project based on their project execution plan as per example listed below. These rates are the contract rates to be applied to all tasks issued under the contract and should match those listed in the Pricing Schedule (Appendix F).

The *staff rates* are:

Category		**Basis of *staff rate*, excluding VAT**	**Applicable parameter**
1	Project Manager	Rate per hour in Rand	R \ hour
2	Project Engineer		R \ hour
3	Senior Control Engineer		R \ hour
4	SHE Specialist		R \ hour
5	Control Engineer		R \ hour
6	E&I Design Specialist		R \ hour
7	Project Support Co-ordinator		R \ hour

8	Project Planner		R	\ hour
9	CAD Operator		R	\ hour

The *expenses* are:

Category		**Basis of expense, excluding VAT**	**Applicable parameter**
1	Subsistence allowance	Amount per day	%
2	Factor applied to transportation costs and accommodation	Factor times cost	Factor =
3	Private car or MPV		
3.1	Engine capacity less than or equal to 1600 cc	Cost per km in Rands	R /km
3.2	Engine capacity greater than 1600 cc		R /km
4	Pick up vans and bakkies		
4.1	Engine capacity less than or equal to 1600 cc	Cost per km in Rands	R /km
4.2	Engine capacity greater than 1600 cc		R /km
5	Printing		
5.1	A4 sheet – B&W	Cost per sheet in Rands	R /sheet
5.2	A4 sheet – Color		R /sheet
5.3	A3 sheet – B&W		R /sheet
5.4	A3 sheet – Color		R /sheet
5.5	A2 sheet – B&W		R /sheet
5.6	A2 sheet – Color		R /sheet
5.7	A1 sheet – B&W		R /sheet
5.8	A1 sheet – Color		R /sheet
5.9	A0 sheet – B&W		R /sheet
5.10	A0 sheet - Color		R /sheet

TRANSNET PIPELINES CONTRACT NUMBER: TPL/2023/07/0002/34824/RFP
DESCRIPTION OF THE SERVICES: THE PROVISION OF ENGINEERING AND CONSTRUCTION MANAGEMENT SERVICES (ECM) FOR THE INLAND NETWORK AUTOMATION PROJECT FOR A PERIOD OF SIX (6) YEARS
RFP PRICING SCHEDULE - FEASIBILITY PHASE - 2023/08

No	Deliverable	Hours Total	Payment Basis LS=Lump Sum payment TC=Time based payment	Resources									Total Cost
				Project Manager	Project Engineer	Senior Control Engineer	SHE Specialist	Control Engineer	E&I Design Specialist	Project Support Co-ordinator	Project Planner	CAD Operator	
		Rate >		R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	
	PLP: FEASIBILITY & BANKABLE FEASIBILITY PHASE	**2,110**	**6 month duration**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**R261,800.00**
1	**Project Management Deliverables**												
1.1	Project Setup activities	40	LS										ERROR
1.2	Project Co-ordination activities	720	TC Basis of Est: 1pp, 6 mnths, 30 hrs per week										ERROR
1.3	Develop Project Execution Plan	150	LS										ERROR
1.4	Develop Feasibility and Execution Project Baseline Schedules	80	LS										ERROR
1.5	Develop Project Quality Management Plan	40	LS										ERROR
1.6	Develop Project Health and Safety Plan	40	LS										ERROR
1.7	Develop Construction Baseline Health & Safety Risk Assessment Report	40	LS										ERROR
1.8	Develop Project Baseline Risk Review	40	LS										ERROR
1.9	Develop Operational Readiness Plan (ORP)	60	LS										ERROR
1.10	Develop Main Automation Contract Scope Of Work and associated BOQ	160	LS										ERROR
1.11	RFP Package development/review	80	TC										ERROR
1.12	Tender Ajudication/review	80	TC										ERROR
1.13	Prepare the Basic Design Report	80	LS										ERROR
1.14	Project Feedback and Progress Meetings	100	TC										ERROR
1.15	Feasibility and Bankable Feasibility Phase Closeout	40	LS										ERROR
1.16	Bankable Feasibility Phase: Gate Review Package Preparation	40	LS										ERROR
2	**Engineering/Technical Deliverables**												
2.1	Update Segregated Process Control & Custody Metering Systems Requirements Concept document. To be approved by TPL stakeholders. Update to address: - Issues with the existing OASyS PCS - ASM User Interface Standard - Tank Gauging requirements	120	TC										ERROR
2.2	Functional Safety Engineering: - Interrogate existing Inland Station HAZOP Study reports for regulatory compliance, and prepare Hazop Assessment reports on a per Inland Station basis. - Develop Station Safety Requirements Specifications and SIL (LOPA) Determination Reports for all Inland Stations.	160 240	LS Basis of Est: 13 Stations (Stations are: ALR, APT, KDL, KRP, LLA, MTN, RTR, SBG, SEC, TLR, TLR-IRP, WAO, WIR)										ERROR
2.3	Review/Update/Approve PCS NOC Migration Strategy for all Inland Stations. To be approved by TPL stakeholders.	80	TC										ERROR
2.4	Develop PCS Changeover Strategy for all Inland Stations. To be approved by TPL stakeholders. This will require the following assessments to be completed: - Whether existing PLC Panels are to re-used or replaced. Will require a site by site determination.	120	TC										ERROR
3	**Field Engineering Deliverables**												
3.1	Site Validation and backdrafting of existing As Built documentation of all IN Stations, including: - P&ID Diagrams - Instrument Schedules - Valve Schedules - Range, Alarm, Trip Schedules - Equipment Room Layouts	1,392	LS Basis of Est: 13 Stations, 6 MBVs 3pp, 4d per station, 1d per MBV										ERROR
4	**Provisional Sums (owned by the Employer)**												
4.1	Reimbursable Expenses	Sum											R261,800.00

Name: _____ Signature: _____ Company Stamp

No	Deliverable	Hours Total	Payment Basis LS=Lump Sum payment TC=Time based payment	Resources									Total Cost
				Project Manager	Project Engineer	Senior Control Engineer	SHE Specialist	Control Engineer	E&I Design Specialist	Project Support Co-ordinator	Project Planner	CAD Operator	
		Rate >		R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	
	PLP: EXECUTION PHASE 1	**3,740**	**6 month duration**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**R101,900.00**
1	**Project Management Deliverables**												
1.1	Project Management, Effort-based activities including: - Project Co-ordination activities - Project Scheduling activities - Project Progress/Reporting Meetings - MAC NEC3 Contract Management activities - Quality Assurance Management activities - Risk Management activities	720	TC Basis of Est: 1pp, 6 mnths, 30 hrs per week										ERROR
1.2	MAC Engineering Supervision: Effort-based supervision and monitoring of the Main Automation Contractor technical activities, including: 1. Finalisation of outstanding design concepts, through reviews and thin-slice demonstrations with the Employer, for PCS/CMS/LDS and HMI Trainer systems. 2. 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. This will include, but not be limited to the following activities: - Tank Gauging functionality - PLC/SCADA Control Module library software updates based on gap analysis, and new Tarlton SIS-certified control modules - Updates of all TPL OASyS Specifications as issued into the project (refer to C3.2: Scope and Site Information Appendix B project Execution Receivables). Updates to these documents will be based on development activities in this Phase1. 3. Establishment of the staging system for software development, testing and configuration on project hardware and development licenses.	1,440	TC Basis of Est: 2pp, 6 mnths, 30 hrs per week										ERROR
1.3	FEL4 - Phase 1 Development Closeout	40											ERROR
2	**Key Project Controls - Setup Activities**												
2.1	Project Management Controls - Setup: Inconjunction with the MAC, set up of integrated project control systems, incl: - Document Management - Cost Control - Project Scheduling - Document and drawing templates - Long Lead Item Procurement Review	160	TC										ERROR
2.2	MAC Project Execution Plan Review	40	TC										ERROR
2.3	MAC Quality Management Plan Review	40	TC										ERROR
2.4	MAC Health and Safety Plan Review	40	TC										ERROR
2.5	MAC Risk Management Plan and Risk Register Review	40	TC										ERROR
2.6	Project Kickoff Workshop (5 days), to include: - Review Contractual Requirements - Review Technical Requirements - Develop Project Management and Technical Deliverables schedule - Conduct Performance tests on the current OASys PCS System - Address outstanding issues with the current OASyS PCS System - Formally introduce Project Execution Receivables (refer to C3.2: Scope and Site Information Appendix B Project Execution Receivables) into the project. Jointly review these documents with the *Contractor*.	240	TC Basis of Est: 3 pp, 10 d										ERROR
3	**Engineering/Technical Deliverables**												
3.1	Review and assist in the updating of Updates of all TPL OASyS Specifications as issued into the project (refer to C3.2: Scope and Site Information Appendix B Project Execution Receivables). Updates to these documents will be based on development activities in Execution Phase 1.	160	TC										ERROR
3.2	Review/Update TPL PCS URS Compliance Statements at end of Phase	40	TC										ERROR
4	**Field Engineering Deliverables**												

Name: _____ Signature: _____ Company Stamp

No	Deliverable	Hours Total	Payment Basis LS=Lump Sum payment TC=Time based payment	Resources									Total Cost
				Project Manager	Project Engineer	Senior Control Engineer	SHE Specialist	Control Engineer	E&I Design Specialist	Project Support Co-ordinator	Project Planner	CAD Operator	
		Rate >		R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	
4.1	Field Engineering Design Tool Set-up & Loop Template Development: Establish detail design application tool and database and templates, as a basis for field engineering.	200	LS										ERROR
4.2	TPL Inland Stations/NOC Site Visits - Familiarisation. Field Engineering E&I Installation Scopes of Work development: - Participate in site visits and review of Inland Station E&I Scopes of Work as prepared by the MAC.	480	LS Basis of Est: 3 pp, 1 mnth										ERROR
4.3	Field Engineering E&I Installation Scopes of Work development: - Participate in and review of E&I Contractor Tender Adjudication and Award processes - Participate in E&I Installation Contractor Safety File review processes	100	LS										ERROR
5	**Provisional Sums (owned by the Employer)**												
5.1	Reimbursable Expenses	Sum											R101,900.00

Name: _____ Signature: _____ Company Stamp

No	Deliverable	Hours Total	Payment Basis LS=Lump Sum payment TC=Time based payment	Resources									Total Cost
				Project Manager	Project Engineer	Senior Control Engineer	SHE Specialist	Control Engineer	E&I Design Specialist	Project Support Co-ordinator	Project Planner	CAD Operator	
		Rate >		R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	
	PLP: EXECUTION & CLOSEOUT PHASE 2	**41,296**	**5 year duration**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**R840,800.00**
1	**Project Management Deliverables**												
1.1	Project Management, Effort-based activities including: - Project Co-ordination activities - Project Scheduling activities - Project Progress/Reporting Meetings - MAC NEC3 Contract Management activities - Quality Assurance Management activities - Risk Management activities	7,800	TC Basis of Est: 1pp, 5 yrs, 30 hrs per week										ERROR
1.2	MAC Engineering Supervision: Effort-based supervision and monitoring of the Main Automation Contractor technical activities, including: • Design, Development, Engineering, Supply, Procurement, Fabrication, Software Development, Testing, Installation, Commissioning and Handover of the Automation System at all Inland stations and the MCC • Detailed Engineering, configuration and tuning of the SimSuite PLMS System, as well as a temporary interface to the existing Atmos Pipe LDS during the period that the new integrated PLMS is commissioned for each site. • Deployment of relevant Inland station PCS/CMS/LDS software to the HMI Trainer currently located at the Pipelines School of Training • Operational Readiness activities • Supervision of E&I Installation Works performed on site. • Co-ordination, management and participation in Site Commissioning activities • Finalisation of as-built, native format, technical documentation associated with the Works, together with operating and maintenance manuals where applicable and the delivery of all IP (Intellectual Property) to the Employer as per the Works Information • Co-ordination of Handover of each Station to TPL Operations, once commissioning is completed.	15,600	TC Basis of Est: 2pp, 5 yrs, 30 hrs per week										ERROR
1.3	FEL4 Closeout Activities	80											ERROR
2	**Engineering Activities/Deliverables**												
2.1	Panel Engineering: Generation of detail design drawings, for PLC, Metering, Server panels, for all Inland stations and NOC, incl: - General Arrangements - IO Termination Schedules - Power Distribution schmetics - IS Barrier Layout diagrams - Wiring digarams	2,320	LS Basis of Est: 13 Stations, 6 MBVs 1pp, 1mnth per site, 1 week per MBV.										ERROR
2.2	Engineering Design Specification for all Inland stations and NOC: Update existing Inland Station EDS's and LWC EDS to be consistent with: - Approved OASyS PCS standards - Approved PLC, SCADA, Metering, PLMS FDS documents - Approved P&IDs	2,320	LS Basis of Est: 13 Stations, 6 MBVs 1pp, 1mnth per site, 1 week per MBV.										ERROR
2.3	Develop TPL Automation Standard, based on OASyS PCS (immediately prior to project closeout). To be approved by TPL stakeholders.	160	TC										ERROR
3	**Field Engineering Activities/Deliverables**												

Name: _____ Signature: _____ Company Stamp

No	Deliverable	Hours Total	Payment Basis LS=Lump Sum payment TC=Time based payment	Resources									Total Cost
				Project Manager	Project Engineer	Senior Control Engineer	SHE Specialist	Control Engineer	E&I Design Specialist	Project Support Co-ordinator	Project Planner	CAD Operator	
		Rate >		R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	
3.1	Site Validation of As-Is Documentation for all IN stations: - Panel Layouts - Instrument JBs (GA's, Termination Schedules) - Cable Block drawings - IO Schedules - Instrument/Valve Loop drawings - Electrical Schematics Notes: 1. Validation in this phase will not include opening of valves and instrumentation - this will be done as part of As Built documentation Verification prior to handover of each station after commissioning. 2. Validated information will be transferred to the detailm design tool, from which updated CAD drawings will be produced.	1,232	LS Basis of Est: 13 Stations, 6 MBVs 2pp, 1w per site, 2d per MBV.										ERROR
3.2	Field Engineering: Generation of field design database for all Inland Stations on basis of validated As-Is documentation. The deliverables are required to enable commencement of MAC Works, and include: - Instrument and Valve Loop drawings and associated IS Loop Certification - SIS Design, incl. SIL Verification - Electrical Schematic updates associated with MV/LV infrastructure impacted by the project - Elecrical and Instrument Cable Block Diagrams, where impacted by the project (All drawings to be delivered in AuoCAD format)	4,400	LS Basis of Est: 13 Stations, 6 MBVs 1pp, 2mnths per site, 1 week per MBV.										ERROR
3	**Commissioning Activities/Deliverables**												
3.1	Assistance with the development of a system change-over plan and risk review that details the process of decommissioning the existing control system, and installing and commissioning the new system on each of the Inalnd Stations and MCC.	5,112	TC Basis of Est: 13 Stations, 6 MBVs 3pp, 3w per site, 3d per MBV.										ERROR
4	**Project Handover Activities/Deliverables**												
4.1	Co-ordination and handover of the completed Works, including as-built documentation, to the Employer's operations department, on a station by station basis.	2,272	TC Basis of Est: 13 Stations, 6 MBVs 2pp, 2w per site, 2d per MBV.										ERROR
5	**Provisional Sums (owned by the Employer)**												
5.1	Reimbursable Expenses	Sum											R840,800.00

Name: _____ Signature: _____ Company Stamp

INLAND NETWORK AUTOMATION PROJECT

PROFESSIONAL SERVICES CONTRACT

For the provision of engineering and construction management services (ECM) as related to the execution of all of the *Works* associated with the Inland Network Automation Project, the administration of the Main Automation Contract, 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.

Part C3.2 *Works Information*

DOCUMENT APPROVAL PROCESS

NAME		**POSITION/MEETING No.**	**SIGNATURE**	**DATE**
Originator:	Mabjana Matenchi	TPL MCI Principal Engineer		
Approver:	Bernard Burger	TPL – Chief Engineer		
Original date:	2023-05-15			
Effective date:	2023-05-13			

DOCUMENTATION DISTRIBUTION, REVISION AND APPROVAL HISTORY

REVISION NUMBER	DATE	PREPARED BY	REVIEWED BY	REVIEWED BY	APPROVED BY
00	2023-04-15	M Matenchi	C Murray	N Thoolsiram	B Burger

SIGNATORIES:

Prepared by: Mabjana Matenchi (TPL MC&I Principal Engineer) — 02 June 2023 (Date)

Reviewed by: Christopher Murray (TPL Specialist Consultant) — 02 June 2023 (Date)

Recommended by: Neresh Thoolsiram (TPL Project Manager) — 05 June 2023 (Date)

ADDITIONAL SIGNATORIES:

Approved by: Bernard Burger (TPL Chief Engineer) — 05-06-2023 (Date)

Accepted by: Thabang Modise (TPL Senior Projects Portfolio Manager) — 05-06-2023 (Date)

Contents

Tables

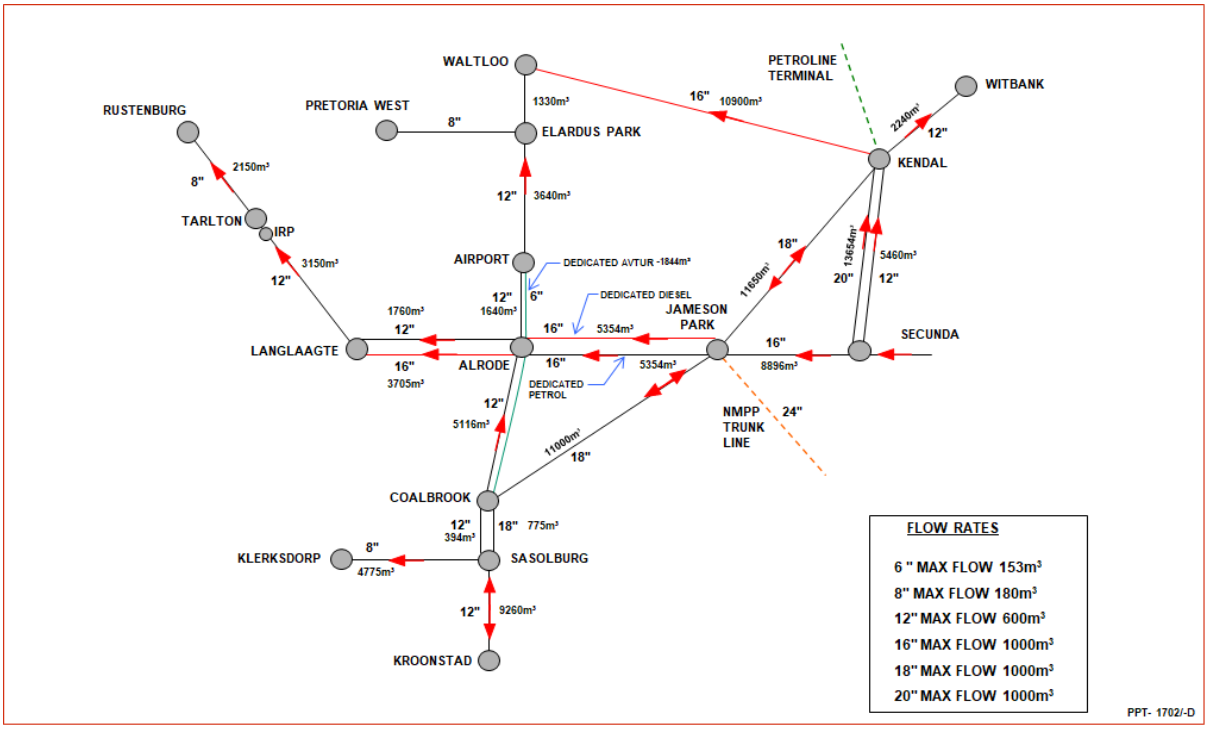
1. Introduction

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



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

1. Refined Product Network, comprising of the following stations:
   - Sasolburg (Intake, Pump Station)
   - Coalbrook (Delivery, Pump Station)
   - Alrode (Delivery, Pump Station, Storage Depot)
   - Jameson Park (Intake, Delivery, Pump Station, Storage Depot)
   - Airport (Delivery Station)
   - Langlaagte (Delivery, Pump Station, Storage Depot)
   - Tarlton (Delivery, Pump Station, Storage Depot, Road & Rail Offloading, Additive Dosing, Refractionator)
   - Rustenburg (Delivery Station)
2. Avtur Pipeline, comprising of the following stations:
   - Coalbrook (Intake, Pump Station)
   - Meyerton (Booster Pump Station)
   - Alrode (Pump Station)
   - Airport (Delivery Station)
3. West Line, comprising of the following stations:
   - Sasolburg (Intake, Pump Station)
   - Klerksdorp (Delivery Station)
4. East Line, comprising of the following stations:
   - Secunda (Intake, Pump Station)
   - Kendal (Switching Station)
   - Witbank (Delivery Station, Storage Depot)
   - Waltloo (Delivery Station, Storage Depot)
5. South Line, comprising of the following stations:
   - Sasolburg (Intake, Pump Station)
   - Kroonstad (Pump, Delivery Station, Storage Depot)
6. PL2, PL3, PL4 Highgate Motorised Block Valve Chambers

All stations are remotely monitored and controlled from a Master Control Centre (MCC) located at the National Operations Centre (NOC) in Pinetown, 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 lack 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 control centre (MCC), from where operation of all pipelines is controlled, managed and supervised. The newly developed PCS was to have a sustainable useful life of > fifteen years (15), incorporate the latest control safety standards, and be able to be deployed throughout the TPL network.

The newly developed Automation System (hereinafter referred to as the *Automation System*) comprises of the following components:

- AVEVA OASyS DNA SCADA interfaced to Schneider m580 PLCs for control and monitoring, and interfaced to Emerson S600+ Metering Flow Computers for custody metering. The OASyS SCADA incorporates integrated SimSuite™ software for pipeline monitoring functionality.

The new PCS has been successfully deployed to all Crude Oil Pipeline stations as well as to the Master Control Centre; with the project being successfully completed in 2021.

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 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 the newly developed *Automation System* (AVEVA OASyS DNA SCADA, Schneider m580 PLCs, Emerson S600+ FC's, SimSuite PLMS) to the Inland Stations listed in Section [3.1] below, as well as at a central 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.

1.4 *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.

1.5 Project Intent

The goal of the project is the deployment of the newly developed automation solution to all Inland stations, as well as to the Master Control Centre, which is harmonized with the *Employer*s strategic, business and technical imperatives as defined in the Inland Network Automation Project: Owner Requirements Specification Ref [1] and its associated standards and receivables.

1.6 References

Project Execution Receivables are detailed in 6.

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

Applicable Regulations and Standards are listed in Table 1-2: Applicable Regulations and Standards – South African below.

Reference Specifications and Standards are listed in Table 1-3: Reference Specifications and Standards below.

1.6.1 Applicable Specifications and Standards

Table 1-1: Applicable *Employer* Specifications and Standards

(Project Wide)

Ref	Title	Doc No.	Rev
[1]	Inland Network Automation Project: Owners Requirements Specification	ORS_04_08_202	01
[2]	Process Control System User Requirements Specification	TPL-TECH-I-C-SPEC-012	03
[3]	Process Control System Software Control Module Standard	TPL-TECH-I-C-SPEC-013	01
[4]	Custody Metering System User Requirements Specification (Integrated)	TPL-TECH-I-M-SPEC-011B	04
[5]	HMI Trainer URS	H354086-00000-270-078-0002	0
[6]	Control System Replay URS	H354086-00000-270-078-0003	0
[7]	Leak Detection User Requirements Specification	H354086-00000-270-078-0004	0
[8]	TPL Drawing Standards	PL100	03
[9]	TPL Plant & Equipment Tag Numbering Standard	PL101	03
[10]	TPL Equipment, Instrument & Electrical Symbology Standards	PL102	01
[11]	General Drawing Standard	PL103	03
[12]	Electrical Design Criteria	PL666	03
[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	01

Ref	Title	Doc No.	Rev
[16]	Code of Practice for Cabling, Racking, Trenching & Earthing	PL727	11
[17]	Product Codes and Colours	2684358-P-SC0-CS-SP-001	00
[18]	Transnet Pipelines Health and Safety Instructions		Latest
[19]	Automation Software Lifecycle Requirements Specification	H354086-00000-270-078-0001	0
[20]	CMS Emerson Floboss S600+ Stream Flow Computer FDS	TPL-TECH-I-M-SPEC-016	4
[21]	CMS Emerson Floboss S600+ Prover Flow Computer FDS	TPL-TECH-I-M-SPEC-017	4
[22]	Safety Requirements Specification – General	H354086-00000-273-078-0001	0
[23]	Pipeline Network Design Criteria	2684358-J-A00-CS-SP-001	4
[24]	Alarm Philosophy	H354086-00000-270-080-0001	0
[25]	Alarm Configuration Database (Typical)	H354086-00000-271-060-0001	A
[26]	Control – Vulnerability and Firewall Configuration Management	TPL-TECH-C-WI-001	01
[27]	Framework for Minimum Controls for Security in the Process Control Environment	TPL-TECH-MC&I-STD-PCE Security Controls Framework-006	2
[28]	NOC Migration Strategy	H354086-00000-XXX-XXX-000X	A
[29]	Segregated Process Control & Custody Metering Systems Requirements Concept Standard	TPL-TECH-I-C-STD-014	03

(OASyS Automation System)

Ref	Title	Doc No.	Rev
[30]	OASyS Integrated HMI Style Guide	E354086-00000-271-078-0006	02
[31]	OASyS PCS SCADA System FDS	E354086-00000-271-056-0018	00
[32]	OASyS SCADA Configuration Plan	E354086-00000-271-078-0010	01
[33]	OASyS PCS PLC FDS	E354086-00000-271-078-0003	02
[34]	OASyS PCS Control Module Specification	E354086-00000-271-078-0005	10
[35]	OASyS PCS Report Plan	E354086-00000-271-078-0009	01
[36]	OASyS PCS SCADA/RTU Communications Plan	E354086-00000-271-078-0012	0E
[37]	OASyS SCADA System Architecture Failure and Recovery Mode Analysis	E354086-00000-271-078-0013	03
[38]	OASyS PLC System Architecture Failure and Recovery Mode Analysis	E354086-00000-271-078-0016	02
[39]	OASyS PCS Diagnostic FDS	E354086-00000-271-078-0027	01
[40]	OASyS Leak Detection System FDS	E354086-00000-271-078-0007	01
[41]	OASyS Pipeline Operations – Liquids Metering System FDS	E354086-00000-271-078-0020	01
[42]	OASyS PCS – Atmos Crude LDS Interface Control Document	E354086-00000-271-078-0029	00
[43]	OASyS PCS HMI Trainer System FDS	E354086-00000-271-078-0004	03

Ref	Title	Doc No.	Rev
[44]	OASyS PCS Replay Configuration Plan	E354086-00000-271-078-0011	01
[45]	OASyS PCS LAN Specification	E354086-00000-271-078-0002	01
[46]	OASyS PCS Network Security Specification	E354086-00000-271-078-0024	02
[47]	OASyS PCS Software Naming Standard	E354086-00000-271-050-0006	02
[48]	OASyS PCS Hardware Naming Standard	H354086-00000-270-078-0005	AC
[49]	OASyS PCS SCADA Software Coding Standard - Scripting	E354086-00000-271-050-0008	01
[50]	OASyS PCS PLC Software Coding Standard	E354086-00000-271-050-0004	03
[51]	URS Compliance Assessment Matrix	E354086-00000-271-078-0019	F
[52]	API1165_API1167 Compliance Statement	API1165_API1167 Compliance.v3.2	3.2
[53]	OASyS PCS System Performance Specification	E354086-00000-271-078-0014	01
[54]	OASyS PCS Metering – SAP Interface Control Document	E354086-00000-271-078-0015	0A

1.6.2 Applicable Regulations and Standards - South African

Table 1-2: Applicable Regulations and Standards – South African

Ref	Title	Doc No.	Rev
[55]	The Occupational Health and Safety Act of South Africa	Act 85 of 1993	1993
[56]	Installation and maintenance of electrical equipment used in explosive atmospheres	SANS 10086	Latest
[57]	The Petroleum Industry Part 2: Electrical and other installations in the distribution and marketing sector Electrical Code	SANS 10089-2	Ed.3, 2007
[58]	The Classification of Hazardous Locations and the Selection of Apparatus for use in Such Locations	SANS 10108	Ed.6, 2014
[59]	Wiring of Premises: Part 1 Low Voltage Installations	SANS 10142-1	Latest
[60]	The Selection, Handling and Installation of Electric Power Cables of rating not exceeding 33kV	SANS 10198	Latest
[61]	Electrical Apparatus for Explosive Gas Atmospheres	SANS 60079	Latest
[62]	Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)	SANS 62262	Ed.1, 2004

1.6.3 Reference Specifications and Standards

Table 1-3: Reference Specifications and Standards

Ref	Title	Doc No.	Rev
[63]	API Pipeline SCADA Alarm Management	API RP 1167	2nd Ed
[64]	Manual of Petroleum Measurement Standards (API applicable chapters)		Latest
[65]	Functional Safety Standard	IEC 61508	Latest

Ref	Title	Doc No.	Rev
[66]	Software Life Cycle Plan	IEEE/EIA 12207.0	Latest
[67]	Pipeline SCADA Security	API 1164	Latest

1.7 Glossary

1.7.1 General Abbreviations

Abbreviation	Definition
BBBEE	Broad Based Black Economic Empowerment
CE	Compensation Event
cFAT	Client Factory Acceptance Test
CMS	Custody Metering System
COP	Crude Oil Pipeline
DAC	TPL Divisional Acquisition Council
DJP	Durban Johannesburg Pipeline
DWP	Durban Witwatersrand Pipeline (Crude Oil Pipeline)
EA	*Employer's* Agent
E&I	Electrical and Instrumentation
ECC	Engineering and Construction Contract
EDMS	Electronic Document Management System
EDS	Engineering Design Specification
EPCM	Engineering, Procurement, Construction Management
EW	Early Warning
FAT	Factory Acceptance Test
FBS	Facility Breakdown Structure
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
HMI	Human Machine Interface
HSE	Health, Safety, Environmental
iFAT	Internal Factory Acceptance Test
IFCR	Issued for Client Review
I/O	PCS Input/Output
IS	Intrinsically Safe
JIT	Just-in-time
LAN	Local Area Network
LDS	Leak Detection System
MAC	Main Automation *Contractor*
MCC	Master Control Centre

Abbreviation	Definition
MDS	Metering Database System
MIS	Management Information System
MTTF	Mean Time To Failure
MTTR	Mean Time To Repair
NEC	New Engineering Contract
O&M	Operating and Maintenance
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	*Project Manager* (NEC)
PMI	*Project Manager's* Instruction
PPM	Transnet Procurement Procedures Manual
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
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
WAN	Wide Area Network

Abbreviation	Definition
WBS	Work Breakdown Structure

1.7.2 Station Abbreviations

Abbreviation	Definition
ALR	Alrode (Multi-products, Avtur)
APT	Airport (Avtur, Coastal Avtur)
CBK	Coalbrook (Multi-products, Avtur)
KDL	Kendal
KRO	Kroonstad
KRP	Klerksdorp
LLA	Langlaagte
JMP	Jameson Park
MTN	Meyerton
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)
WIR	Witbank

1.7.3 Definitions

Term	Definition
Automation System	The newly developed Automation System comprising of the following components: AVEVA OASyS DNA SCADA interfaced to Schneider m580 PLCs for control and monitoring, and interfaced to Emerson S600+ Metering Flow Computers for custody metering. The OASyS SCADA incorporates integrated SimSuite software for pipeline monitoring functionality.
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. (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.

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.
Consultant	In the context of this RFP, the *Consultant* provides consulting engineering and other relevant services (ECM) over the Project Lifecycle associated with the Inland Network Automation Project. The Consultant 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 *Works Information* 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
Employer	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 *Works*. In the context of this RFP, the activity includes development of Main Automation Contract scopes of work as detailed in the MAC *Works Information* 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 Works are executed and closed out. In the context of this RFP, the activity includes scopes of work detailed in this *Works Information* 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.

Term	Definition
	(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.
Global	Common and/or applicable across the entire project.
Main Automation Contractor (MAC)	In the context of this RFP, the *Main Automation Contractor* executes the *Works* (Main Automation Contract) involving the design, development, 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.
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 NOC. Only commands originating from the NOC are accepted. Note: Alarm annunciation and its associated acknowledgment follows Mode of Control.
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.
OEM CoE	Global subject matter centre of excellence for each system as applied to petroleum pipeline operations
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 *Employer*.
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.
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.

2. General Description of the *Works (Main Automation Contract)*

2.1 Full Project Scope

The *Works (Main Automation Contract)* involves the design, development, 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 [3.1] in accordance with the requirements formulated in 6 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:

- PCS (AVEVA OASyS DNA SCADA, interfaced to Schneider m580 PLCs for control and monitoring
- Custody Metering system integrated into the PCS, interfaced into Emerson S600+ FC's for custody metering,
- Pipeline Monitoring system integrated into the PCS, comprising of SimSuite™ PLMS)

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

2.1.1 Process Control System (PCS)

- Software development and testing of existing Global System library updates and new functionality (hardware and software) associated with the OASyS PCS *Automation System*, to the level of definition where such can be deployed into project execution.
- Development and deployment of the *Automation System* (process control, integrated custody metering, and pipeline monitoring systems) to all Inland stations and the NOC during the execution phase of the project.
- PLC and SCADA including associated panels, hardware, software, local area networks, IO, data archiving and replay functionality.
- 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 *Others*.
- Interfaces to existing plant systems and equipment, in general including the re-use of existing sensors, actuators, field wiring.
- Interface to existing LV/MV panels, including the engineering, modification and replacement of remote IO.

2.1.2 Custody Metering System (CMS)

- The CMS shall be integrated with the Process Control System, and shall include associated panels, hardware, software, ticketing and data archiving.
- Interface to Emerson Floboss S600+ flow computers, ref [20] and [21].
- Interfaces to existing plant systems and equipment, in general including the re-use of existing sensors, actuators, field wiring.

2.1.3 Leak Detection System (LDS)

- The LDS shall be integrated with the Process Control System using the SimSuite™ suite of Realtime functionalities, including associated panels, hardware, software and data archiving.
- Interfaces to existing plant systems, equipment and related systems.

The existing Atmos Pipe LDS system is required to remain active as each of the station PCS systems are upgraded.

2.1.4 HMI Training System

- Inland station PCS/CMS/LDS software shall be deployed to the existing HMI Trainer currently located at the Pipelines School of Training to facilitate operational readiness.

2.1.5 Field E&I *Works*

- 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*.

2.1.6 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 - PLMS (OPC 2.0) - Variable Speed Drives (Profibus DP) - Tank Gauging Systems - SNMP devices
	Replay.	Integrated Replay System.
Metering.	Flow Computer.	Hardware, software and associated periphery equipment.
	Integrated Metering Data Base System (MDS).	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) Safety Instrumented Systems (Tarlton Refractionator) SCADA. PLC.	Associated loops, hardware and periphery equipment. Servers, hardware, software. Hardware, software and associated periphery equipment.
MIS.	SAP.	SAP IS-OIL Interface, as per [54].
Existing PLMS System (Atmos Pipe)	OPC. 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 (SimSuite)	OPC. 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. SimSuite™
HMI Trainer.	SCADA.	Standalone servers, hardware, software.

System 2 – Process Control Network		
Sub Systems	**Elements**	**Components**
Wide Area Network (WAN). (Excluded from the *Works*)	Fibre Optic Network. µWave 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)

3. *MAC Works* Execution

3.1 Inland Stations forming part of the *Works*

Transnet Pipelines (TPL) require automated PCS systems at its respective Inland intake, delivery, and pumping stations (referred to as 'stations'), as well as at a central Master Control Centre (MCC), from where it controls, manages and supervises its operations; and a Secondary Control Centre (SCC) as a back-up control centre.

Automation System upgrades are required at the following Inland stations:

Refined Product (RPP) Stations:

- Sasolburg (SBG) Intake, Pump Station
- Coalbrook (CBK) Delivery, Pump Station (Already upgraded to new Automation System)
- Alrode (ALR) Delivery, Pump Station, Storage Depot
- Airport (APT) Delivery Station
- 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

Avtur Pipeline Stations:

- Coalbrook (CBK) Intake, Pump Station (Already upgraded to new Automation System, requires modifications to enable control of MTN from CBK)
- Meyerton (MTN) Booster Pump Station
- Alrode (ALR) Pump Station
- Airport (APT) Delivery Station

West Line Stations:

- Sasolburg (SBG) Intake, Pump Station
- Klerksdorp (KRP) Delivery Station

East Line Stations:

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

South Line Stations:

- Sasolburg (SBG) Intake, Pump Station
- Kroonstad (KRO) Delivery Station, Storage Depot (Excluded from *Works*)

PL2, PL3 Highgate Motorised Block Valve Stations:

- PL2-MBV Motorised Block Valve
- PL3-MBV Motorised Block Valve
- PL4-MBV Motorised Block Valve

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.

3.2 PLP: FEASIBILITY & BANKABLE FEASIBILITY PHASE (PRE-MAC CONTRACT AWARD)

3.2.1 Phase Objectives

During the PLP: Feasibility and Bankable Feasibility Phases, comprehensive basic engineering is completed to the level required to execute the *Works* and includes development of Main Automation Contract scopes of work as detailed in the MAC Works Information document. A Gate Review Process is concluded at the end of this Phase to determine if the project progresses through to PLP: Execution and Closeout Phases.

Phase Objectives are as follows:

1. On-boarding of a *Consultant* for the provision of engineering and construction management services (ECM) as related to the execution of the all of the *Works* associated with the Project, the administration of the Main Automation Contract, 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.
2. Development of key project management documentation deliverables required in the Execution Phase of the project. Deliverables are detailed in section 3.5 of this document, and include the following:
    - Project Execution Plans, Project Baseline Schedules, Project Health & Safety Plans, Project Baseline Risk Reviews, Operational Readiness Plans
    - Development of Main Automation Contractor (MAC) Scopes of Work, BOQ and other documentation relating to the Main Automation Contractor RFP
    - Completion of tender processes associated with the appointment of a suitable Main Automation Contractor to complete the associated *Works.*
3. Development of the following Engineering concepts and designs to a level where MAC Scopes of Work can be finalised:
    - Operational requirements as contained in Segregated Process Control & Custody Metering Systems Requirements Concept document. Designs to address, amongst others, any issues with the current OASyS PCS implementation, ASM User interface, and Tank Gauging requirements.
    - Functional Safety Engineering, including the preparation of station HAZOP Assessment reports for regulatory compliance, and the development of individual station Safety Requirements Specifications and SIL (LOPA) Studies.
    - Review of NOC Migration Strategies to be followed in the Execution Phase of the project.
    - Development of PCS Changeover Strategies to be followed in the Execution Phase of the project. This will include the following assessments:
        - Whether existing PLC Panels are to be re-used or replaced. Will be dependent on whether existing PLC panels are fit-for-purpose and whether m580 hardware is able to fit into the existing panels.
4. Field Engineering activities: Site validation and back-drafting of existing, Employer-issued As-Built documentation to be used in the Execution Phase of the project.
5. Preparation of the Bankable Feasibility Phase Gate Review documentation, in preparation for completing the Gate Review and commencing with the Execution Phase of the project.

3.2.1.1 *Employer's Design Review*

Upon completion of the Feasibility and Bankable Feasibility Phases, a formal Gate Review process is undertaken within Transnet to determine if the project is at a level of definition to progress through to Execution and Close Out Phases of the project.

3.3 PLP: EXECUTION & CLOSEOUT PHASES (POST-MAC CONTRACT AWARD)

3.3.1 Project Execution Phasing

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

i. Phases have been selected to minimise risks associated with:
   - Project execution,
   - Interpretation and translation of requirements,
   - System configuration to meet infrastructural constraints.

ii. Demonstration of system compliance to performance requirements [53].

This implies that:

i. An *Employer's* Design Review is held at key points in project execution.

ii. Subsequent phase execution is approved on prior phase compliance.

iii. Pre-engineering activities are conducted for the ensuing phase to expedite procurement activities immediately following phase approval.

3.3.2 EXECUTION 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 solution will be confirmed by the *Consultant* together with Transnet Pipelines prior to execution of the next phase.

PHASE 2 EXECUTION PHASE – Full automation upgrade of all Inland stations (including MCC interface). This Phase is further subdivided into the following groups for execution, in accordance with the approved NOC Migration Strategy [28]:

(2A) EXECUTION Phase 2A: Comprising of the following IN Stations:
- Secunda SEC (Refined Products)

(2B) EXECUTION Phase 2B: Comprising of the following IN Stations (including MCC interface):
- Coalbrook CBK (Avtur Pipeline) – Minor Works to enable Meyerton to be controlled from Coalbrook
- Meyerton MTN (Avtur Pipeline)
- Alrode ALR (Avtur Pipeline)
- Airport APT (Avtur and Coastal Avtur)
- Alrode ALR (Refined Products)
- PL2-MBV2, PL2-MBV3, PL2-MBV6 (Motorised Block Valves, JMP-ALR)
- PL3-MBV11 (Motorised Block Valves, ALR-LLA)

(2C) EXECUTION Phase 2C: Comprising of the following IN Stations (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)

(2D) EXECUTION Phase 2D: Comprising of the following IN Stations (including MCC interface):
- Sasolburg SBG (Refined Products)
- Klerksdorp KRP (Refined Products)

Note: Kroonstad is excluded from the *Works.*

(2E) EXECUTION Phase 2E: Comprising of the following IN Stations (including MCC interface):
- Kendal KDL (Refined Products)
- Witbank WIR (Refined Products)
- Waltloo WAO (Refined Products)
- PL4-MBV7, PL4-MBV15 (Motorised Block Valves, KDL-WAO)

(2F) EXECUTION Phase 2F: Comprising of the following IN Stations (including MCC interface):
- Tarlton Refractionator TLR-IRP

These phases may run sequentially or concurrently.

Note that engineering, commissioning, tuning and handover of the PLMS will be executed at the end of each of the Phases 2A, 2B, 2C, 2D, 2E and 2F 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.

3.3.3 Phase 1: DEVELOPMENT

3.3.3.1 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:

1. Establishment and setup of key project, quality and safety management controls, including the following (Consultant and MAC):
   - Setup of integrated project control systems for document management, cost control, and project scheduling,
   - Finalisation of document and drawing templates,
   - Review and approval of MAC Project documentation, including MAC Project Execution Plans, Project Schedules, Quality Management Plans, Health & Safety Plans and Risk Management Plans.
2. *Contractor's* analyses of and development of an understanding of the *Employer's* requirements. This will be done via a Project Kick-off *Works*hop and Site familiarisation visits to all Inland Stations and the NOC, to be scheduled on commencement of the MAC Contract.
3. Finalisation of outstanding design concepts, through reviews and thin-slice demonstrations with the *Employer*, for PCS/CMS/LDS and HMI Trainer systems (MAC). These include, but are not limited to the following functionalities:
   - Tank Gauging functionality
   - Control Module Library updates:
     - A gap analysis is to be conducted between the existing TPL library (2018 release) and new developments in the OASyS baseline offering, as contained in the latest release of software. This will serve to inform if any updates to the TPL Library are required or not.

- Development of SIS certified control modules (SIL 1) for use in the Tarlton Refractionator PCS software.

4. 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 (MAC). This will include, but not be limited to the following activities:
   - Tank Gauging functionality
   - Control Module Library updates:
     - Based on a gap analysis between the existing TPL library (2018 release) and new developments in the OASyS baseline offering, as contained in the latest release of software.
     - Development of SIS certified control modules (SIL 1) for use in the Tarlton Refractionator PCS software.
   - Updates to all TPL OASyS Specifications as issued into the project (refer to 6 Project Execution Receivables). Updates to these documents will be based on the Global System Designs developed in this Phase of the project.
5. Establishment of the staging system for software development, testing and configuration on project hardware and development licenses (MAC).
6. Field Engineering: Establish detail design application tool and database and templates, as a basis for field engineering in the Execution Phase of the project (Consultant).
7. Field E&I Installation *Works* (MAC):
   - Detail all E&I Installation *Works* required to be completed for all Inland Stations and at the NOC, split into the individual phases 2A, 2B, 2C, 2D, 2E and 2F, to the level of definition to appoint an E&I installation *Contractor*.
   - Appoint an E&I Installation *Contractor* to perform the E&I Installation *Works*.

3.3.3.2 *Employer's Design Review*

Upon completion of the Development Phase deliverables, a formal Owners Team design review will be conducted. At the design review, the Owners Team will:

- 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 *Employer*s' South African operating and maintenance environment; and
- Assess, based on the *Contractor*'s Development execution performance, if the risks associated with the remainder of *Works* is tolerable.

Failure to comply with any of the above criteria will constitute a 'no-go' outcome for the solution and the remainder of the *Works* will not progress to the next Phase, in which case the *Consultant* will be required to proceed with an alternative Process Control System solution by reinitiating the relevant Project and Technical Processes.

3.3.4 Phase 2: Multi-Station EXECUTION

3.3.4.1 Phase Objectives (Phase 2A, 2B, 2C, 2D, 2E, 2F)

Automation upgrades are performed at the all Inland Network stations as referenced in [3.1] and at the Master Control Centre located in the National Operations Centre in accordance with the *MAC Works Information*.

Multi-Station EXECUTION has been split into six phases as detailed in section [3.2] above. The *Consultant* shall manage the *Works* in accordance with the approved project schedule, on a just-in-time phase-by-phase basis. Note: Phases may run sequentially or concurrently.

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

1. Engineering Activities (*Consultant*):
   - Generation of detail design drawings for PLC, Metering, Server panels for all Inland stations and NOC, for use by the *MAC Contractor* when executing panel build activities.
   - Development of Engineering Design Specifications (Software) for all Inland Stations and the NOC, to guide MAC software development activities. Existing Inland Station EDS's to be used as a design basis.
2. Field Engineering Activities (*Consultant*):
   - Site Validation of all 'As-Is' documentation as issued by the *Employer*.
   - 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, at the time of handover of each station to TPL Operations.
3. E&I Installation *Works (MAC)*:
   - Completion of the E&I Installation *Works* associated with the Inland stations and NOC, as determined in Phase 1 of the *Works*.
4. Inland Station and NOC *Automation Systems*: Design, Development, Engineering, Supply, Procurement, Fabrication, Software Development, Testing, Installation, Commissioning and Handover (*MAC*):
   - Complete the detailed hardware 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.
   - Procurement of all hardware and software in accordance with the approved designs.
   - Procurement of all maintenance and commissioning spares.
   - Development of station software in accordance with the station EDS and approved software standards.
   - Completion of all hardware and panel FATs, where all hardware, panels PCS/CMS panels are inspected and tested, and anomalies corrected and approved by the *Employer*, prior to release to site.
   - Completion of all PCS/CMS/LDS and HMI Trainer software FATs, where all hardware, software is tested, and anomalies corrected and approved by the *Employer*, prior to release to site.
   - Development of a system change-over plan and risk review that details the process of decommissioning the existing control system, and installing and commissioning the new system.
   - Delivery of the FAT'd systems and equipment to site, and completed site *Works* in accordance with the approved change-over plan.
   - Commissioning of the *Automation System* in accordance with the approved commissioning plan.
   - Handover of the completed *Works*, including as-built documentation, to the *Employer*'s operations department, on a station by station basis, once commissioning of individual stations have been completed.
5. Pipeline Monitoring Systems (*MAC*):

- Complete the detailed engineering and implementation of the PLMS on a phase by phase basis, in compliance with the Works Information and based on the concepts established during Phase 1 DEVELOPMENT.
- Configuration of a temporary interface between the PCS and the existing Atmos Pipe LDS system at each station, to ensure that the Leak Detection function remains active until the new integrated LDS is commissioned for all the stations belonging to a phase.
- Implement the PLMS on a just-in-time basis to coincide with the PCS implementation completion on the last station within a Phase.
- Changeover from the temporary interface between the PCS and the existing Atmos LDS system, to the new integrated PLMS.
- 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.

6. HMI Trainer System (*MAC*):
   - Deployment of relevant Inland station PCS/CMS/LDS software to the HMI Trainer currently located at the Pipelines School of Training to facilitate operational readiness.
7. Operations Readiness (*MAC*):
   - Train the *Employer*'s Operations and Maintenance personnel on the *Automation Systems* (PCS/CMS/LDS) installed on all Inland stations and at the MCC, to ensure operational readiness before the new automation systems are placed into operation at each of the sites.

The *Consultant* shall assist with the planning and execution of all phases and aspects of the Project to ensure that the Project is executed expeditiously and efficiently. He shall ensure that all *Contractor*s and other parties concerned are provided with such plans and reports. These shall be provided in such a manner and at such times as to enable such contactors and other parties to carry out their duties and obligations in accordance with a logical and efficient programme and in terms of their respective commitments and contracts.

3.3.4.2 *Employer's Design Review*

Each Execution phase (2A, 2B, 2C, 2D, 2E and 2F) is concluded with a formal system review and performance test.

Based on the execution and test results, the Owners Team will:

- Based on the presented deliverables, assess if the specified technical requirements have been complied with, and,
- Assess if the technical solution can be practically operated, maintained and adequately supported in his South African operating and maintenance environment; and,
- Assess, based on the *Contractor*'s Pilot Execution performance, if the risks associated with the remainder of *Works* is tolerable.

Failure to comply with any of the above criteria will constitute a 'no-go' outcome and the remainder of the *Works* will not progress to the next Phase, in which case the *Consultant* will be required to proceed with an alternative deployment strategy for the Process Control System solution by reinitiating the relevant Project and Technical Processes.

3.4 Sectional/*Works* Completion

In order to ensure compliance of the full integrated PCS, CMS and LDS system to performance and functional requirements, the following shall apply:

- Sectional Completion at each site shall be applicable to system hardware, panels and site Works, but shall not apply to automation system software. The defect correction period and warranty period associated with a station's hardware, panels and site Works shall commence at the station's sectional completion date.
- 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.

3.5 Schedule

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

(1) FEASIBILITY *WORKS* Complete: estimated Six (6) Calendar months after contract award,

(2) EXECUTION Phase 1 DEVELOPMENT Complete: estimated Six (6) Calendar months after Main Automation Contract Start Date,

(3) Phase 2 Multi-Station EXECUTION Complete: estimated Six (6) Calendar years after Main Automation Contract Start Date.

Table 3-1 represents a provisional schedule which informs the *Employer's* dates above. The *Consultant* 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

△1

No.	Parameter	*Employer* Schedule Dates (Completion)
1	ECM Contract Award	2023-09-29
2	Feasibility and Bankable Feasibility execution	2023-12-14
3	Bankable Feasibility Phase Gate Review	2024-02-14
4	Business Case approvals for Execution Phase and Close Out	2024-03-13
5	Bankable Feasibility Phase Closeout	2024-04-15
6	MAC Contract Award	2024-06-24
7	Completion of DEVELOPMENT Phase 1	2025-01-25
8	Completion of Phase 2A Handover	2025-06-18
9	Completion of Phase 2B Handover	2026-10-26
10	Completion of Phase 2C Handover	2028-02-03
11	Completion of Phase 2D Handover	2028-11-30
12	Completion of Phase 2E Handover	2030-03-30
13	Completion of Phase 2F Handover	2030-11-11
14	Project Closeout	2030-12-09

3.6 Project Dependencies

Project execution is dependent on completion of the following key events (executed by *Others*), with listed target completion dates:

- The early completion of Secunda Tele-mechanical Upgrade Project: Deployment of the Automation System to the Secunda station (Phase 2A) is dependent on completion of the Tele-Mechanical upgrade Works at Secunda.
- Airport depot in-line with PL 6 Pipeline project requirements, including all MBV on the PL 6 pipeline (Phase 2B).
- The scheduling and award of adequate operational shutdowns by TPL Operations at each station in order to de-commission existing control and metering hardware and install, test and commission new OASyS systems.

The *Consultant* is required to quantify the potential schedule and cost impact of these risks on the *Works* execution on the basis of a three month, six month and one year slippages.

4. *EPCM Works:* General Description of the Services to be provided by the *Consultant*

4.1 *Employer's* Objective

The *Employer's* objective is to enter into a six year contract with an option to extend (at the sole discretion of Transnet Pipelines) with a *Consultant* to provide consulting engineering and other relevant services over the Project Lifecycle of the Inland Network Automation Project. The *Consultant* shall undertake the services with the clear understanding that they are acting as the *Employer's* representative and is therefore fully aware and knowledgeable of Transnet business requirements policies and procedures. The *Consultant* will comply with the relevant policies and procedures applicable to Transnet Pipelines as updated from time to time.

4.2 Role of the *Consultant* within the Project Context

The *Consultant* is responsible for the provision of engineering and construction management services (ECM) as related to the execution of the all of the *Works* associated with the Project, the administration of the Main Automation Contract, 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.

The *Consultant* shall function within the Project Owners Team led by Transnet Pipelines Project Manager, who is the *Employer's Agent* with the aim of supporting all phases of the Project towards achieving a successful implementation of the Project.

In achieving this goal, the *Consultant* shall:

(1) Maintain communications with the *Employer*'s Agent along with Owner's project team. It should be noted that although direct lines of communication between the *Consultant* and the *Employer's Agent* is required for discussion/resolution of all Technical Issues, all such proposals/agreements shall be made with the consent of the *Employer's Agent*, who carries overall responsibility for Project Management.

(2) Consult with the Owner's project team or authorised representatives and assist the team with requirements sessions and outcome analysis.

(3) Evaluate and interpret user requirements through formally defined requirements definition processes across the project life cycle and translate these into technical design documents such as User Requirement Specifications, Functional Design Specifications, Engineering Design Specifications, Engineering Design Drawings, Standards and Programming Specifications in support of the execution of the *Works*.

(4) Conduct preliminary investigations, planning and design, where any of these are required for determination of feasibility of the *Works*.

(5) Field check and verify the accuracy of all drawings and any other data furnished by the *Employer*.

(6) Formally accept the already developed design parameters of all Systems, Sub systems and Elements; set the design parameters and define the various scopes of work during the Feasibility (which includes PLP Bankable phase) and Execution stages, permitting the *Employer* to complete all tender processes associated with the *Works*. This may include investigations into the following aspects:

- The scopes of *Works* prepared for various tenders are to be optimised for cost and schedule efficiencies and should take into consideration minimisation of project risks and management of interfaces between *Contractor*s.

- Long lead items are to be identified in order to initiate timeous procurement cycles.

(7) Prepare detailed Scopes of *Works* encompassing all software, hardware, instrumentation, electrical and mechanical activities required to be performed at the various sites.

(8) Prepare documentation supporting the *Employer's* procurement processes and project lifecycle deliverables listed in section 9 Appendix D for the Feasibility, Bankable Feasibility and Execution & Closeout phases of the project. Details around each deliverable and *Employer*'s Project Lifecycle Process information will made available to assist the successful *Consultant* in executing their role.

(9) Advise the *Employer* on the best strategy for the construction and procurement of materials and equipment. The *Consultant* shall ensure that all contracts prepared on behalf of the *Employer* are appropriate and shall protect the *Employer's* interest in so far as interface issues, delays, damages to property and defects of the *Works*.

(10) Provide assistance with the evaluation of Tenders received, and the submission of recommendations.

(11) Develop project management documentation, including Project Execution Plans, Baseline Project Schedules, Quality Management Plans, Project Health & Safety Plans, Construction Baseline Health & Safety Risk Assessment Reports.

(12) In-conjunction with the Main Automation *Contractor*, set up integrated project systems to assist in the management of the *Works*, including document control, cost control, and project scheduling.

(13) Be responsible for all technical issues relating to design, supply, and installation and commissioning of the phases of the *Works*. These responsibilities include requirements analysis, functional analysis and allocation, architecture/design, systems analysis and control, and system verification and validation.

(14) Provide Engineering Design services, and prepare all engineering design documentation and drawings required to enable and assist the Main Automation *Contractor* to complete the *Works*. Engineering Design services shall include but not be limited to panel designs, field engineering designs, safety instrumented designs, SIS loop certification and software engineering designs; required to be performed during the project at various sites, and may include investigation and collation of already available data, drawings and plans relating to the *Works*.

(15) Review the Main Automation *Contractor*s' detailed scope of *Works* and provide amendments through the *Consultant's* and *Employer's* formal change management processes as necessary.

(16) Prepare additional detailed scope of *Works* for *Works* not included in the Main Automation *Contractor*s' scope of *Works*.

(17) Manage the aforementioned phases of the *Works* in accordance with industry standard practices by performing formal Systems Engineering activities spanning the entire program life cycle.

(18) Manage the software lifecycle development processes for:

- Software Development setup and test environment,
- Process Control System (PCS/CMS/PLMS) hardware and software design,
- Global and individual Station Software Development for PCS/CMS/LDS and HMI Trainer Systems.

(19) Embed formal software development life-cycle processes into the project and impose compliance to these practices on the Main Automation *Contractor* and any other subsequent *Contractor*'s engaged in this project.

(20) Coordinate and perform functions such as proof of concept testing, factory acceptance testing and investigations with technical counterparts from customers and partner firms.

(21) Provide from time to time, in accordance with the provisions of the contract, such other data as may be reasonably required for the correct execution of the Project and for which no provision is being or has been made.

(22) Design any process or system or refine the preliminary process design, where such process design is required in support of the *Works*.

(23) Liaise with TPL operations and maintenance representatives to identify appropriate implementation approaches at various stages of execution of the *Works*.

(24) Supervise the construction and overall management of the *Works* to ensure work is carried out by the various *Contractor*s in accordance with the design criteria and to the requisite standards. This will include supervising safety management on site, obtaining evidence of defective work and establishing facts in relation to any defective *Works* in order to protect the *Employer* from any claims and to effect remediation of such defects. The *Consultant* shall be responsible for any defects of the *Works* that have arisen as a result of the *Consultant*'s negligence in carrying out construction management services.

(25) Hold review and conduct meetings and submit minutes of such meetings to the *Employer's Agent* and to all concerned parties. Unless instructed differently by the *Employer's Agent*, the *Consultant* shall attend as a minimum the following meetings:

- Kick-off to be held at the start of a Phase;
- Six monthly Contract Steering Committee Meetings;
- Weekly Progress and Coordination Meetings;
- Monthly progress meetings with dashboards on project status, risks, etc. and
- Close-out meetings – sectional completion and contract completion

(26) Lead and direct technical project staff participating in the project as per established policies and practices of organisation. Provide experienced "hands-on" team members to technical areas of the program. Assist in ensuring project technical resources are suitably equipped to perform all assigned roles.

(27) Maintain in-depth technical knowledge of all products and components utilised in the execution of the *Works*.

(28) Review, evaluate and check *Contractor*'s drawings of plant, equipment and systems for the *Works* for conformity with design requirements.

(29) Control and co-ordination of all Quality Assurance issues that may arise between the *Employer* and the *Contractor*, ensuring full compliance with SABS/ISO procedures.

(30) After completion of the *Works*, finalise as-built, native format, technical documentation associated with the *Works*, together with operating and maintenance manuals where applicable and the delivery of all IP (Intellectual Property) as per the *Works Information*.

(31) Agree final quantities with *Contractors*, including assisting with re-measurement on site if required.

(32) Provide NEC3 Contract Management services, management and co-ordination of other *Contractor*s appointed for completing the *Works*.

(33) Assist in resolving disputes or differences that may arise between the *Employer* and the *Contractor*, including mediation, arbitration and litigation. Prepare for and provide assistance with contemplated or actual mediation, arbitration or litigation proceedings should it be required.

The *Consultant* shall provide all professional services, technical staff, and support personnel to achieve the intent described in the *Works Information*, in the best interest of Transnet Pipelines.

The services shall comprise, without exception, every professional discipline and expertise necessary to meet all the requirements as described in these *Works* and in accordance with industry accepted standards requisite for professional practice and services of this nature.

The *Consultant* shall provide the services in terms of System Engineering processes as defined in the ISO/IEC 15288:2008, 15939; IEEE 1220-1998 and IEEE/EIA 12207.0 standards as well as those cited in the *Works* for the full development and engineering lifecycle of all the *Works*. These processes are to be embedded in the *Contractor's* team.

These shall include the following Project processes:

- Planning,
- Assessment and control,
- Decision management,
- Risk management,
- Configuration management,
- Information management,
- Measurement; and

These shall include the following Technical processes:

- Stakeholder requirements definition,
- Requirements analysis,
- Architectural design,
- Engineering design,
- Implementation,
- Integration,
- Verification,
- Transition,
- Validation,
- Operation,
- Maintenance,
- Disposal.

4.3 Data to be supplied to the *Consultant*

Transnet Pipelines will furnish, with all reasonable expedition, all available pertinent data and information and give such assistance as may reasonably be required to the *Consultant* for the carrying out of his duties under this agreement.

4.4 Project Execution

The *Consultant* is required to familiarise himself with the current stage of progress of the various Phases of the entire *Works* and will assume full responsibility for the execution of the *Works* from start to completion of the entire *Works*.

4.5 Alterations of Modifications to Designs

In the event of circumstances arising which could not reasonably have been foreseen or in the event of Transnet Pipelines ordering modifications to designs, completed or in progress, which require the alterations or remaking of any specifications or other documents prepared in whole or in part by the *Consultant*, the whole of the cost of revising, amending or reproducing documents to bring the Project up to the stage at which it was modified shall be paid for as per the agreed compensation event process in the contract.

4.6 Minor Variations

The *Consultant* shall have the authority to make minor variations to design as may be necessary or expedient, provided such variations do not alter the final cost as set out in the Contract and with the approval of the *Employers Agent*.

The prior written approval of Transnet Pipelines shall be obtained for the following:

(1) Any substantial modification of the design,

(2) Any work for which no specific item at scheduled rates in the cost schedule is applicable,

(3) Any instruction to the *Contractor*, which constitutes a substantial variation or omission from or addition to the contract.

4.7 Responsibility of the *Consultant*

The *Consultant* shall be fully responsible and held accountable for all designs, and specifications proposed and submitted by him and for all technical decisions taken by him. The *Consultant* shall meet all ECSA legislation with doing Consulting engineering work in South Africa.

The *Consultant* shall provide at no additional compensation, professional services necessary to respond to and resolve all 3rd party *Contractor* design related claims arising wholly or in part from the professional's conduct relating to errors or omissions or other aspects of the project design or the *Consultant's* performance which are inconsistent with the 3rd party contract.

The *Consultant* warrants that it will perform its services in accordance with the current standards of care and diligence normally practised by normal engineering organisations in providing services of a similar nature. If within 12 (twelve) months of completion of the services by the *Consultant*, it is shown that there is an error in the services as a result of the *Consultant's* failure to meet these standards, and the *Employer* has notified the *Consultant* in writing of any such error within that period, the *Consultant* shall re-perform such services, within the original scope of services, as may be necessary to remedy such an error. All costs incurred by the *Consultant* in performing such corrective services shall be at the *Consultant*'s cost.

Where rights, responsibilities and remedies with respect to the services are given in this agreement, such rights, liabilities, responsibilities and remedies shall be exclusively those set forth in this agreement with respect to the relevant services.

4.8 Compliance with Laws

The *Consultant* shall comply with all laws or regulations applicable to or in connection with the Project, and with all applicable requirements of any Government, Provincial or other responsible public authority.

4.9 Non-Assignment

The *Consultant* shall not assign or transfer his rights or obligations or any part thereof under this agreement without the prior written approval of Transnet Pipelines, provided the *Consultant* may

at any time take into partnership a partner or partners, and that he or they shall thereafter be deemed to be included in the expression "the *Consultant*", where the context so allows or permits.

4.10 *Consultant* Experience Requirements

The *Consultant* 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*:

(1) Have a sound proven knowledge of multi-product and single product Petroleum Pipeline operations.

(2) 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 *Works*tations 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 SimSuite™ for pipeline monitoring.

It is a requirement that the *Consultant* 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 2 or more projects related to the development and deployment of process control systems within a petroleum pipeline environment, each project of value greater than or equal to R 50 mil; and a minimum of one project involving the development and deployment of Aveva OASyS DNA PCS SCADA and Schneider m580 PLC Systems into a petroleum pipeline environment.
- Key personnel appointed to this project complying with the requirements listed in section 4.11 below.

(3) Have extensive knowledge and proven experience with custody transfer metering systems as used on Petroleum Pipelines. This shall include a sound knowledge of the API metering guidelines and their application.

Emerson S600+ Flow Computers are currently used by Transnet Pipelines for custody metering applications. It is a requirement that the *Consultant* demonstrates both proven experience and competency in the design, configuration, software development, testing and deployment of these systems in a petroleum pipeline environment.

(4) Have extensive knowledge and proven experience with pipeline leak detection systems and in particular the following pipeline monitoring systems that are currently in use on Transnet Pipelines:

- Simsuite™ 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*.
- Atmos™ Pipe Leak Detection, Batch Tracking, Pig Tracking and other RTA's currently in use on Inland pipelines;

It is a requirement that the *Consultant* 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.

(5) Have extensive proven experience with pipeline instrumentation systems and design.

(6) Have extensive proven experience with pipeline electrical and earthing systems and design.

(7) Have extensive knowledge and proven experience with pipeline safety instrumented (SIS) and PLC systems.

(8) Have extensive knowledge and proven experience with Tanker Loading systems.

(9) Have extensive knowledge and proven experience with pipeline hazardous area classification.

(10) Have adequate qualifications for the services to be performed. Note in this regard, that all engineering designs are required to be signed off by personnel registered with the Engineering Council of South Africa (ECSA) within their respective fields of expertise.

The *Consultant* 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.

4.11 *Consultant* 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.

4.11.1 Project Manager

The Project Manager shall have as a minimum,

- 5 years' of industrial project coordination experience.
- Experience managing complex software projects.
- Experience managing international project teams.
- Experience in large project execution (>$10m).
- Holds a BTech technical qualification in any engineering field with a project management diploma.

4.11.2 Project Engineer

The Project Engineer shall have as a minimum,

- 5 years' of petroleum pipeline experience in a project development environment.
- Experience managing international software development teams.
- Experience managing multi-system integration.
- Holds a BTech/Diploma within the relevant field and is ECSA registered.

4.11.3 Senior Control Engineer – SCADA

The Senior Control Engineer shall have as a minimum,

- 5 years' of process control software development and coordination experience in a petroleum pipeline environment;
- 2 years' experience in the design, configuration, software development, testing and deployment of the specific systems 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 *Works*tations.

  The specific systems include the following:
  - Aveva OASyS DNA SCADA (incl. Liquid Management Suite functionality)
  - Simsuite™ and Atmos™ Pipe PLMS software

- Interface to Schneider m580 PLCs and Emerson S600+ Flow Computers

- Completed relevant OEM certified SCADA training courses. Relevant courses include the following:
  - AVEVA OASyS DNA Product Training courses: Essentials, Component Administration, Applications Programming, Display Building, Reporting Services and Generation, Liquids Suite Overview, LMS Configuration and Operation.
- Holds a BTech/Diploma within the relevant field.

4.11.4 Senior Control Engineer – PLC

The Senior Control Engineer shall have as a minimum,

- 5 years' of process control software development and coordination experience in a petroleum pipeline environment;
- 2 years' experience in the design, configuration, software development, testing and deployment of the specific systems to be deployed to all Inland Stations as part of these *Works*. This shall include amongst others, hardware and software configuration, communication networks, telecontrol protocols, databases, historian/ replay servers and interfaces.

  The specific systems include the following:
  - Schneider m580 PLCs
  - Emerson S600+ Flow Computers
  - Interface to Aveva OASyS DNA SCADA Systems
- Completed relevant OEM certified PLC training courses. Relevant courses may including the following:
  - Schneider courses: m580 Programming (Hardware), Unity Pro Programming (Software)
- Holds a BTech/Diploma within the relevant field.

4.12 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 *Consultant* shall submit a written request to the *Employer*s Agent and this substitution request shall include the following:

- A request in writing for a No Cost Contract Modification.
- Detailed written justification.
- 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.

4.13 Sufficiency of Tender

The *Consultant* acknowledges by signing this contract that he has a clear understanding of the project scope of work, and further acknowledges that the Offer made by the *Consultant* based on the terms and conditions of this service contract, provide adequate professional fees for the *Consultant* to provide the required services. No increase in fees to the *Consultant* will be allowed unless there is material change made to the project scope of work and the scope of work change is accepted and approved in writing by the *Employer*'s Agent. The *Consultant* shall immediately

inform the *Employer*'s Agent in writing whenever it is anticipated that the authorised contract value may be in jeopardy of being exceeded.

4.14 Transnet Pipelines Project Execution Strategy

All of the capital projects in the Transnet Capital Projects portfolio are managed according to the Project Lifecycle Process (PLP) methodology. The PLP is the methodology for the effective management of Capital Investment projects within Transnet to ensure that all projects are managed with a consistent approach.

The PLP is broken up into 4 sequential phases namely;

- Concept Phase: Completed for this project.
- Pre-feasibility Phase: Completed for this project.
- Feasibility and Bankable Feasibility Phases: where the project is defined and the execution planning of the project completed. The engineering of the project is currently in the Feasibility Phase and between 30% and 40% complete. A project gate review is to be held towards the end of the Bankable Feasibility phase before funding for the Execution and Closeout phases of the project can be sought.
- Execution Phase: where the project is implemented. This includes all testing and commissioning up to plant / equipment handover.
- Close-out Phase: This is the final phase and includes commercial, financial and technical closure of the project.

In accordance with Transnet Project Lifecycle Process (PLP), this Inland Network Automation Project has been classified as a Type B project.

The scope of the consulting (ECM) services is for *Works* to be undertaken from the Feasibility to the Close-out Phase of the PLP process. The *Consultant* shall prepare all associated submissions for the Bankable Feasibility gate review process and shall assist in addressing its deliverables and / or serve as a panel member. All upfront *Works* completed by the *Employer* as intended by the Concept, Pre-Feasibility and Feasibility phases of such *Works* shall be adopted by the *Consultant*. The *Consultant* shall participate in and manage the Project Lifecycle Processes as identified in Feasibility, Bankable Feasibility, Execution and Close-out Phases and any *Works* arising therefrom, such as preparation of RFI, POC, RFP documentation, participation and evaluation of POC testing etc..

4.15 Communications

All communication initiatives shall be approved by Transnet Pipelines. The *Consultant* shall abide to all communication requirements imposed upon them by Transnet Pipelines. Any communication received, produced or issued by the *Consultant* shall first be reviewed by Transnet Pipelines before being transferred onto another party. This covers but is not limited to; engagement with market place, advertisements, communications with Transnet Clients, industry forums, magazines, websites or blogs.

The engagement, communication (timing and context) templates and formats shall be agreed and signed off by the *Employer*s Agent before any deliverables are started. Time spent correcting incomplete and incorrect documentation will be for the *Consultant*` s own cost. All reports shall be cross-referenced against other disciplines and tools to ensure accuracy and integration of information. All communications direct, indirect, 3rd party or other shall be captured in the relevant document control system.

4.16 Documentation Control

The *Consultant*'s documentation shall comply with the *Employer*'s standards and requirements. The *Employer* will issue all relevant documentation to the *Consultant*, but control, maintenance and handling of these documents will be the *Consultant*'s sole responsibility, at the *Consultant*'s expense, and managed with a suitable document control system. At agreed periods throughout the development of the project the *Consultant* will be required to transfer/migrate documentation to the TPL 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.

All documents issued to 3rd Party *Contractor*s and to the *Employer* must be submitted as per the TPL's Document policy. Any contractual communication between Transnet Pipelines and the *Contractor*s shall be issued by the *Consultant* on behalf of Transnet Pipelines. These communications shall be similarly recorded through the *Consultant*'s Document Control System.

Documents issued by the *Consultant* 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.

The *Consultant* shall ensure that all documentation issued to the *Employer* and 3rd party *Contractor* is of good quality, and terms used and layouts of documentation shall be kept consistent throughout the project.

4.17 Environmental and Sustainability Management

The *Consultant* shall have required environmental expertise and experience to manage all environmental and sustainability planning requirements during the EXECUTION stage.

4.18 Health and Safety Requirements

The *Consultant* shall have required H&S expertise and experience to manage all H&S planning requirements during the Execution and Closeout phases.

The *Consultant* shall comply with all applicable legislation, regulations issued in terms thereof and with Transnet's safety rules, which shall be entirely at the *Consultant*'s cost and which shall be deemed to have been allowed for in the rates and prices.

4.19 ICT

(1) The *Consultant* shall provide and have available computing, server, back-up, communications, software's and licencing in order to successfully interface with Transnet's tools and systems.

(2) Should the *Consultant* access Transnet's Information Assets; they will use these in a manner that will not harm or endanger Transnet as a company in line with the Transnet's Information Security Policy and any other related policies.

(3) The *Consultant* shall sign the confidentiality agreement to adhere to Transnet's Information Security Policy and all other relevant Transnet's Policies

(4) The software used shall similarly be conversant with Transnet's approved software in order to meet the obligation of the document control process spelt out in this document.

(5) The *Consultant* shall make available connectivity, internet access, ICT infrastructure and applications access, document control access and any other systems used by the *Consultant* shall be made available to the *Employer* at any point in time during the project

(6) The *Consultant* shall ensure that all data stored on the *Works*tations is backed up to the secure server provided by the *Consultant*. 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.

4.20 Legal

The *Consultant* shall involve Transnet Pipelines Legal department for any legal matter as detailed in the legal policy and any other legal matter associated to the *Consultant*'s scope of services, this shall include all notified disputes.

The *Consultant* shall comply with all South African legislation and statutory requirements. Applicable legislation includes but is not limited to:

(1) The Occupational Health and Safety Act of South Africa (OHSA) (Act 85 of 1993),

(2) Construction Regulations contained in Government Gazette No. 37305, Notice No. 10113, dated 07 February 2014, as applicable, and ensures that all notices and other documents required in terms of the said Construction Regulations are copied timeously to the Project Manager,

(3) The Minerals Act and Regulations (Act 50 of 1991 as amended),

(4) The Atmospheric Pollution Prevention Act of South Africa (Act 45 of 1965),

(5) The Water Services Act (Act 108 of 1997),

(6) National Water Act (Act 36 of 1998),

(7) The Hazardous Substances Act of South Africa (Act 15 of 1973 as amended),

(8) National Building Regulations and Building Standards Act (Act 103 of 1977),

(9) Environmental Conservation Act of South Africa (Act 73 of 1989),

(10) Mineral and Petroleum Resources Development Act (Act 28 of 2002),

(11) National Environmental Management Act (Act 107 of 1998),

(12) National Environmental Air Quality Amendment Act (Act 39/04),

(13) The Copyright Act (Act 98 of 1978),

(14) All local laws and regulations; and

(15) RSA Legal Metrology Act.

4.21 Quality Assurance Requirements

(1) The onus rests on the *Consultant* to produce work which conforms to the quality requirements stated in the contract. The *Consultant* 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.

(2) The *Consultant* shall review and accept (where they have authority to do so) quality documentation provided by the *Contractor*s contracted with Transnet SOC.

(3) The *Consultant* 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.

(4) It is recorded that material provided by the *Employer* to the *Consultant* for the services may include designs done by others. The *Consultant* shall obtain approval from the *Employer*s Agent before any design reviews or checks are undertaken.

(5) Where material is "Free-issued" the *Consultant* shall undertake normal quality review process as if the material was not "free-issued", unless otherwise instructed by the

*Employer*s Agent. The *Consultant* shall report to the *Employer* any concerns he may have with the material for the *Employer*'s decision.

(6) The *Consultant* shall guarantee that:

- The *Consultant* and any 3rd party *Contractor* supplies appropriate and suitable skills to execute the *Works* in accordance with this *Works Information*,
- 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* / *Employer*s Agent,
- 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 *Consultant*,
- 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,

(7) The *Consultant* shall ensure that:

- The *Contractor* performs all quality related activities as specified in ISO 9001:2008 "Quality Management System", or equivalent, acceptable to the *Employer*.
- The *Contractor* provides the necessary quality management systems to ensure that the quality of the *Works* complies with the requirements of the *Works Information*.
- 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*.
- The *Contractor*'s performance of his obligations under the Contract is not deemed complete until the *Employer*s Agent is in receipt, on proper forms, of all Technical Data and other documents to be submitted to the *Employer*s 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 *Employer*s Agent receipt of all the above data without prejudice to any other remedy of the *Employer*.
- All Plant and Material are new, merchantable, of the most suitable grade and fit for their intended purposes,
- All materials proposed by a *Contractor* for incorporation into the work are tested in accordance with the required specification. All test results are submitted to the *Employer*s Agent for approval prior to such materials being built into the *Works*. No material is built into the *Works* without such approval.
- 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 *Employer*s Agent. The *Contractor* removes unsuitable, obsolete or worn-out Equipment from the site when ordered to do so by the *Employer*s Agent.
- 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*.

(8) The *Consultant* shall submit:

- A comprehensive Project Quality Plan (PQP) for review and approval by the *Employer*.
- 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 *Consultant*'s organisation indicating how the project will be staffed,

  b. Detail the interface with the *Consultant*'s Quality Management System and applicable documents, procedures and work instructions,

  c. Detail the *Consultant*'s design review and verification requirements for the *Works*,

  d. Detail the *Consultant*'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 *Contractor*s and sub*contractor*s, including their quality program and level of supplier source inspection of sub-ordered material. The *Consultant* shall ensure that approved Sub*contractor*s 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.

(9) The *Consultant* shall submit a software development lifecycle (SLCP) plan for approval by the *Employer*s 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.

(10) The *Consultant* shall ensure the *Contractor* formally submits a Software Configuration Management Plan (SCMP) for review and approval by the *Employer*s Agent. The *Consultant* shall monitor adherence to the SCMP for the configuration of all the *Works* systems and software. To this end the *Consultant* shall designate a competent software development engineer to monitor the *Contractor*s approved quality and SLCP program to ensure compliance with all the requirements of the *Works*.

(11) The *Consultant* shall request inspections of the *Works* by the *Employer* or governmental agencies only after that portion of the *Works* is ready for inspection.

(12) The *Consultant* shall ensure that:

- All hardware, software and equipment is subject to Factory Acceptance Testing (FAT) prior to delivery to site.
- All inspections and tests shall be supported by inspection or test procedures prior to the inspections and tests taking place.

(13) Quality Control Plans (QCP) developed for each contract are to be managed by the *Consultant*. 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 *Consultant* and 3rs party *Contractor* insofar as the quality control hold points,

(14) The *Consultant* shall monitor the quality management system and shall audit any of the above systems throughout the life cycle of the project.

(15) The *Consultant* 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 *Consultant*.

4.22 Risk Management.

(1) It is the *Consultant*'s obligation to proactively manage and mitigate against all risk.

(2) Where suitable, the *Employer*s Agent and the *Consultant* shall discuss which risks are best managed by whom and necessary delegations shall be provided to ensure that party has authority to manage accordingly.

(3) The *Consultant* shall be transparent and open in the approach to risk management with the *Employer*.

(4) An adequate escalation/engagement procedure shall be proposed by the *Consultant* to ensure the severity of the risk is addressed in the right time frame by the right person.

(5) The *Consultant* may use their own Project Risk Management templates provided that they are approved for use by the *Employer*.

5. Document Lifecycle Management

5.1 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
2023-05-01	0	1	Issued for Review

This table summarises what has been changed in the document so that it is easy to keep track of the effected changes.

5.2 Comments Resolution

Date	Section	Comment	Resolution
26/04/23	1.6, App A	PM to confirm latest revision no's of all documents	
26/04/23	1.6.1	It was agreed that the Automation Standard for the OASyS system would be generated before Project Closeout by the Consultant, based on Typical Device Groups.	Included in Consultant Contract BOQ and Works Information
26/04/23	3.3 Project Execution	It was agreed that SEC would be upgraded first as a priority – to be paid for out of the SEC Tele-Mech Upgrade project. Work to commence in parallel with Execution Phase 1 Development.	Document updated accordingly
26/04/23	3.3 Project Execution	MBV control: KDL is not always manned, not until recently due to fuel theft. The control should maybe move to WOA.	To be determined during Execution Phase.
26/04/23	3.3.2	Inclusion of Tarlton Refractionator into the *Works.*	Document updated accordingly

This table lists comments and the basis of resolution to keep track of decision outcomes and reasoning.

6. 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:

No.	System/Area	Document	Document No.	Rev.	Timing
1	**Global**	**TPL Standards & Specifications**			
1.1	PCS	Process Control System User Requirements Specification (Note 1)	TPL-TECH-I-C-SPEC-012	03	On Contract award
1.2	PCS	Process Control System Software Control Module Standard	TPL-TECH-I-C-STD-013	01	On Contract award
1.3	HMI Training System	HMI Trainer User Requirements Specification	H354086-00000-270-078-0002	0	On Contract award
1.4	PCS	Control System Replay User Requirements Specification	H354086-00000-270-078-0003	0	On Contract award
1.5	CMS	Custody Metering System User Requirements Specification	TPL-TECH-I-M-SPEC-011B	04	On Contract award
1.6	LDS	Leak Detection User Requirements Specification	H354086-00000-270-078-0004	0	On Contract award
1.7	Project-wide	TPL Drawing Standards	PL100	03	On Contract award
1.8	Project-wide	TPL Plant & Equipment Tag Numbering Standard	PL101	03	On Contract award
1.9	Project-wide	TPL Equipment, Instrument & Electrical Symbology Standards	PL102	01	On Contract award
1.10	Project-wide	TPL General Drawing Standard	PL103	03	On Contract award
1.11	Project-wide	P&ID Legend Sheet 1	H354086-00000-270-276-0001-0001	A	On Contract award
1.12	Project-wide	P&ID Legend Sheet 2	H354086-00000-270-276-0001-0002	A	On Contract award
1.13	Project-wide	P&ID Legend Sheet 3	H354086-00000-270-276-0001-0003	A	On Contract award

No.	System/Area	Document	Document No.	Rev.	Timing
1.14	Project-wide	Electrical Design Criteria	PL666	03	On Contract award
1.15	Project-wide	Specification for Telecontrol Communications Network Standard	PL703	03	On Contract award
1.16	Project-wide	PLC, Metering and Server Panel Specification	E354086-00000-271-078-0025	02	On Contract award
1.17	Project-wide	Specification for Uninterruptible Power Supplies	PL720	01	On Contract award
1.18	Project-wide	Code of Practice for Cabling, Racking, Trenching & Earthing	PL727	11	On Contract award
1.19	Project-wide	Product Codes and Colours	2684358-P-SC0-CS-SP-001	00	On Contract award
1.20	Project-wide	Transnet Pipelines Health and Safety Instructions	H354086-00017-250	Latest	On Contract award
1.21	Project-wide	Automation Software Lifecycle Requirements Specification	H354086-00000-270-078-0001	0	On Contract award
1.22	CMS	CMS Emerson Floboss S600+ Stream Flow Computer FDS	TPL-TECH-I-M-SPEC-016	4	On Contract award
1.23	CMS	CMS Emerson Floboss S600+ Prover Flow Computer FDS	TPL-TECH-I-M-SPEC-017	4	On Contract award
1.24	PCS (SIS Trip Amplifiers & Loops)	Safety Requirements Specification – General	H354086-00000-273-078-0001	0	On Contract award
1.25	Project-wide	Pipeline Network Design Criteria	2684358-J-A00-CS-SP-001	4	On Contract award
1.26	PCS/CMS/LDS	Alarm Configuration Database (Typical)	H354086-00000-271-060-0001	A	On Contract award
1.27	PCS/CMS/LDS	Alarm Philosophy	H354086-00000-270-080-0001	0	On Contract award
1.28	Project-wide	Control – Vulnerability and Firewall Configuration Management	TPL-TECH-C-WI-001	01	On Contract award
1.29	Project-wide	Framework for Minimum Controls for Security in the Process Control Environment	TPL-TECH-MC&I-STD-PCE Security Controls Framework-006	2	On Contract award
1.30	Project-wide	NOC Migration Strategy	H354086-00000-XXX-XXX-000X	A	On Contract award
1.31	Project-wide	Segregated Process Control & Custody Metering Systems Requirements Concept Standard	TPL-TECH-I-C-STD-014	03	On Contract award

No.	System/Area	Document	Document No.	Rev.	Timing
2	**Global**	**OAyS PCS Specifications**			
2.1	PCS/CMS/LDS	Integrated HMI Style Guide	E354086-00000-271-078-0006	02	With RFP and on Contract award
2.2	PCS/CMS/LDS	OASyS PCS System – HMI Display Catalogue	E354086-00000-271-056-0005	BA	With RFP and on Contract award
2.3	PCS/CMS	OASyS PCS SCADA System FDS	E354086-00000-271-078-0018	01	With RFP and on Contract award
2.4	PCS/CMS	OASyS SCADA Configuration Plan	E354086-00000-271-078-0010	01	On Contract award
2.5	PCS	OASyS PCS PLC FDS	E354086-00000-271-078-0003	02	With RFP and on Contract award
2.6	PCS/CMS	OASyS PCS Control Module Specification	E354086-00000-271-078-0005	10	With RFP and on Contract award
2.7	PCS/CMS/LDS	OASyS PCS Report Plan	E354086-00000-271-078-0009	01	With RFP and on Contract award
2.8	PCS/CMS/LDS	OASyS PCS SCADA/RTU Communications Plan	E354086-00000-271-078-0012	0E	On Contract award
2.9	PCS/CMS/LDS	OASyS SCADA System Architecture Failure and Recovery Mode Analysis	E354086-00000-271-078-0013	03	On Contract award
2.10	PCS/CMS/LDS	OASyS PLC System Architecture Failure and Recovery Mode Analysis	E354086-00000-271-078-0016	02	On Contract award
2.11	PCS/CMS/LDS	OASyS PCS Diagnostic FDS	E354086-00000-271-078-0027	01	With RFP and on Contract award
2.12	LDS	OASyS Leak Detection System FDS	E354086-00000-271-078-0007	01	With RFP and on Contract award

No.	System/Area	Document	Document No.	Rev.	Timing
2.13	CMS	OASyS Pipeline Operations – Liquids Metering System FDS	E354086-00000-271-078-0020	01	With RFP and on Contract award
2.14	CMS	OASyS Pipeline Operations – Metering Operations Manual	E354086-00000-271-056-0001	00	On Contract award
2.15	CMS	OASyS Pipeline Operations – Metering Maintenance Manual	E354086-00000-271-056-0002	00	On Contract award
2.16	PCS	OASYS PCS System Operator Manual	E354086-00000-271-056-0004	01	On Contract award
2.17	LDS	OASyS PCS – Atmos Crude LDS Interface Control Document	E354086-00000-271-078-0029	00	With RFP and on Contract award
2.18	PCS/CMS/LDS	OASyS PCS HMI Trainer System FDS	E354086-00000-271-078-0004	03	With RFP and on Contract award
2.19	PCS/CMS/LDS	OASyS PCS Replay Configuration Plan	E354086-00000-271-078-0011	01	With RFP and on Contract award
2.20	PCS/CMS/LDS	OASyS PCS LAN Specification	E354086-00000-271-078-0002	01	With RFP and on Contract award
2.21	PCS/CMS/LDS	OASyS PCS Network Security Specification	E354086-00000-271-078-0024	02	With RFP and on Contract award
2.22	PCS/CMS/LDS	OASyS PCS Software Naming Standard	E354086-00000-271-050-0006	02	On Contract award
2.23	PCS/CMS/LDS	OASyS PCS Hardware Naming Standard	H354086-00000-270-078-0005	AC	On Contract award
2.24	PCS/CMS/LDS	OASyS PCS SCADA Software Coding Standard - Scripting	E354086-00000-271-050-0008	01	On Contract award
2.25	PCS/CMS/LDS	OASyS PCS PLC Software Coding Standard	E354086-00000-271-050-0004	03	On Contract award
2.26	PCS/CMS/LDS	URS Compliance Assessment Matrix	E354086-00000-271-078-0019	F	On Contract award
2.27	PCS/CMS/LDS	API1165_API1167 Compliance Statement	API1165_API1167 Compliance.v3.2	3.2	On Contract award
2.28	PCS/CMS/LDS	Crude PCS Upgrade Project – Decision Register	H354086-00000-720-060-0004	0W	On Contract award

No.	System/Area	Document	Document No.	Rev.	Timing
2.29	PCS/CMS/LDS	OASyS PCS System Performance Specification	E354086-00000-271-078-0014	01	With RFP and on Contract award
2.30	CMS	OASyS PCS Metering – SAP Interface Control Document	E354086-00000-271-078-0015	0A	With RFP and on Contract award
3	**Inland Stations**	**Documentation and Drawings**			
3.1	Site P&ID Drawings:	AIRPORT AVTUR AIRPORT COASTAL AVTUR ALRODE AVTUR ALRODE HP ALRODE LP ALRODE TANK FARM & BLENDING KENDAL KLERKSDORP KROONSTAD HP KROONSTAD LP LANGLAAGTE MEYERTON RUSTENBURG SASOLBURG LP SASOLBURG HP SECUNDA LP SECUNDA HP TARLTON HP & LP MANIFOLD TARLTON TANK FARM TARLTON ROAD LOADING TARLTON RAIL LOADING TARLTON ADDITIVE DOSING	G52001-L4021-K999 G52001-L4021-K998 G52001-L4018-K994 2684358-U-DS5-PR-PD-002, 2684358-U-DS5-PR-PD-004, 2684358-U-DS5-PR-PD-005 G52001-W4036-K999 G52001-U4020-K999 G52001-M4014-K999-001, G52001-M4014-K999-002 G52001-V4024-K999 G52001-L4037-K999 G52001-N4026-K999 G52001-U4016-K999-001, G52001-U4016-K999-002 G52001-U4031-K899-001, G52001-U4031-K899-002 G52001-R4025-K999-001, G52001-R4025-K999-002, G52001-R4025-K999-003, G52001-R4025-K999-004 G52001-R4025-K999-005	1.2 1.5 1.1 03 03 03 1.3 1.3 1.0 1.1 1.7 1.2 1.5 1.0 1.6 1.2 1.2 1.0 1.2 1.1 1.1 D	With RFP and on Contract award

No.	System/Area	Document	Document No.	Rev.	Timing
		TARLTON REFRACTIONATOR	25913-8820-25-1100, 25913-8820-25-1200, 25913-8820-25-1300, 25913-8820-25-1400, 25913-8820-25-1500, 25913-8820-25-1600, 25913-8820-25-1700, 25913-8820-25-1701, 25913-8820-25-1800, 25913-8820-25-1900, 25913-8820-25-1901, 25913-8820-25-1902	A4 A4 A4 S1 S1 R2 S1 S1 S2 S2 S1 S1	
		WALTLOO	G52001-V4022-K999	1.0	
		WITBANK	G52001-U4027-K999	1.1	
3.2	Site HAZOP Reports:	AIRPORT ALRODE AVTUR ALRODE MP KENDAL KLERKSDORP KROONSTAD LANGLAAGTE MEYERTON RUSTENBURG SASOLBURG SECUNDA TARLTON MP TARLTON REFRACTIONATOR WALTLOO	TBA	TBA	On Contract award

No.	System/Area	Document	Document No.	Rev.	Timing
		WITBANK			
3.3	Site Software Engineering Design Specifications:	AIRPORT AVTUR	G52001-L4021-U002	1.1	With RFP and on Contract award
		AIRPORT COASTAL AVTUR	G52001-L4021-U004	1.0	
		ALRODE AVTUR	G52001-L4018-U002	01	
		ALRODE MP	G52001-L4018-U001	1.3	
		KENDAL	G52001-L4036-U001	1.5	
		KLERKSDORP	G52001-U4020-U001	E	
		KROONSTAD	G52001-M4014-U001	1.0	
		LANGLAAGTE	G52001-V4024-U001	1.8	
		MEYERTON	G52001-L4037-U002	1.3	
		RUSTENBURG	G52001-N4026-U001	1.1A	
		SASOLBURG	G52001-U4016-U001	1.8	
		SECUNDA	G52001-U4031-U001	1.0	
		TARLTON MP	G52001-W4025-U010	1.4	
		TARLTON REFRACTIONATOR	G52001-T4043-U001	2.0	
		WALTLOO	G52001-V4022-U001	1.0	
		WITBANK	G52001-V4027-U001	1.1	

No.	System/Area	Document	Document No.	Rev.	Timing
3.4	Site PLC I/O Schedules:	AIRPORT ALRODE KENDAL KLERKSDORP KROONSTAD LANGLAAGTE MEYERTON RUSTENBURG SASOLBURG SECUNDA TARLTON MP TARLTON REFRACTIONATOR WALTLOO WITBANK	G52001-L4021-L054 G52001-L4018-L054 G52001-L4036-L054 G52001-U4020-L054 G52001-M4014-L054 G52001-W4036-L054 G52001-L4037-L054 G52001-N4026-L054 G52001-U4016-L054 G52001-W4031-L054 G52001-W4025-L054 G52001-T4043-L054 G52001-V4022-L054 G52001-U4027-L054	1.1 1.1 1.2 1.1 F 1.3 1.3 1.2 1.4 1.2 1.0 2 1.0 1.0	With RFP and on Contract award
3.5	Site As-built E&I Design Data Pack	AIRPORT ALRODE AVTUR ALRODE MP KENDAL KLERKSDORP KROONSTAD LANGLAAGTE MEYERTON RUSTENBURG SASOLBURG SECUNDA TARLTON MP TARLTON REFRACTIONATOR WITBANK	Dossier	TBD	On Contract award

No.	System/Area	Document	Document No.	Rev.	Timing
		WALTLOO PL2 MBVs PL3 MBVs PL4 MBVs			

7. Appendix B: Inland Station Design Basis

		EXECUTION PHASE 2A		EXECUTION PHASE 2B							EXECUTION PHASE 2C				EXECUTION PHASE 2D				EXECUTION PHASE 2E					EXECUTION PHASE 2F	
	Site Schedule	Phase 2A Units Total	Secunda	Phase 2B Units Total	Meyerton	Alrode Avtur	Airport	Alrode MP	PL2 MBVs (MBV2, MBV3, MBV6)	PL3 MBVs (MBV11)	Phase 2C Units Total	Langlaagte	Tarlton	Rustenburg	Phase 2D Units Total	Sasolburg	Klerksdorp	Kroonstad	Phase 2E Units Total	Kendal	Witbank	Waltloo	PL4 MBVs (MBV7, MBV15)	Phase 2F Units Total	Tarlton Refractionator
1	Site Data																								
1.01	Station Type		Intake, Pump Station		Booster Pump Station	Pump Station	Delivery Station	Delivery, Pump Station, Storage Depot	Motorised Block Valves	Motorised Block Valves		Delivery, Pump Station, Storage Depot	Delivery, Pump Station, Storage Depot, Road Loading, Rail Loading, Additive Dosing	Delivery Station		Intake, Pump Station	Delivery Station, Storage Depot	Delivery, Pump Station, Storage Depot		Intake, Switching Station	Delivery Station, Storage Depot	Delivery Station, Storage Depot	Motorised Block Valves		Refractionator
1.02	PCS System details (Existing)		Siemens LSX, Simatic S7 PLCs		Siemens LSX, Simatic S7 PLCs	Siemens LSX, Simatic S7 PLCs	Siemens LSX, Simatic S7 PLCs	Siemens LSX, Simatic S7 PLCs	Siemens Simatic S300 PLCs	Siemens Simatic S300 PLCs		Siemens PCS7, Simatic S7 PLCs	Siemens PCS7, Simatic S7 PLCs	Siemens LSX, Simatic S7 PLCs		Siemens LSX, Simatic S7 PLCs	Siemens LSX, Simatic S7 PLCs	Siemens LSX, Simatic S7 PLCs		Siemens PCS7, Simatic S7 PLCs	Siemens LSX, Simatic S7 PLCs	Siemens PCS7, Simatic S7 PLCs	Siemens Simatic S300 PLCs		Siemens LSX, Simatic S7 PLCs
1.03	Metering Manifold Configuration		6 x Product 1 x Prover		-	-	AV Manifold: 1 x Product 1 x Prover CAV Manifold: 1 x Product 1 x Prover	6 x Product 1 x Intermix 1 x Prover	-	-		6 x Product 1 x Intermix 1 x Prover	3 x Product 1 x Intermix 1 x Prover	2 x Product 1 x Intermix 1 x Prover		6 x Product 2 x Prover	3 x Product 1 x Intermix 1 x Prover	3 x Product 1 x Intermix 1 x Prover		0 [Petroline Intakes x 6 ON HOLD]	6 x Product 1 x Intermix 1 x Prover	6 x Product 1 x Intermix 1 x Prover	-		-
1.04	Metering Flow Computers		7 x S600		-	-	4 x micro5000	8 x S600	-	-		8 x S600	5 x S600	4 x micro5000		8 x S600	5 x S600	8 x S600		-	8 x S600	8 x S600	-		-
1.05	Device Groups		HP - 16, LP - 6		5	9	AV - 7, CAV - 6	HP - 19,LP - 22	3	1		HP - 6,LP - 12	AN - 20,DISTR - 2	HP - 4, LP - 11		HP - 23, LP - 12	HP - 4, LP - 12	HP - 6, LP - 12		12	HP - 4,LP - 12	HP - 6,LP - 12	2		19
2	Devices																								
2.01	Receivers	1	1	4	-	1	1	2	-	-	4	2	1	1	3	1	1	1	6	3	1	2	-	0	-
2.02	Launchers	3	3	4	-	1	-	3	-	-	2	1	1	-	4	3	-	1	2	2	-	-	-	0	-
2.03	Motors DOL 3.3kV	8	8	11	1	1	-	9	-	-	0	-	-	-	6	6	-	-	3	-	3	-	-	0	-
2.04	Motors VSD 3.3kV	0	-	0	-	-	-	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-	-	0	-
2.05	Motors DOL 400V	9	9	26	7	1	4	14	-	-	62	9	49	4	23	9	7	7	18	2	7	9	-	18	18
2.06	Custody Meter Manifolds	6	6	9	-	-	2	7	-	-	14	7	4	3	20	6	7	7	14	-	7	7	-	0	-
2.07	Provers	2	2	3	-	-	2	1	-	-	3	1	1	1	4	2	1	1	2	-	1	1	-	0	-
2.08	Prover Transfer Tanks	1	1	4	-	-	1	3	-	-	5	3	1	1	8	2	3	3	6	-	3	3	-	0	-
2.09	Intermix Tanks	0	-	4	-	-	-	4	-	-	7	1	3	3	8	-	4	4	8	1	4	3	-	2	2
2.10	Accumulator Tanks	0	-	4	-	-	-	4	-	-	14	5	9	-	0	-	-	-	6	-	4	2	-	3	3
2.11	Valves (Actuated)	107	107	237	8	13	26	186	3	1	226	89	102	35	329	91	104	134	301	81	94	124	2	31	31
2.12	Road Loading	0	-	3	-	-	-	3	-	-	14	1	12	1	2	1	-	1	3	1	1	1	-	1	1
2.13	Rail Loading	0	-	0	-	-	-	-	-	-	7	-	7	-	0	-	-	-	0	-	-	-	-	3	3
2.14	Additive Dosing Tanks	0	-	0	-	-	-	-	-	-	12	-	12	-	0	-	-	-	0	-	-	-	-	0	-
2.15	Gas Burner System	0	-	0	-	-	-	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-	-	1	1
2.16	Distillation Columns	0	-	0	-	-	-	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-	-	1	1
3	I/O Counts [1]	1,099		2,564							2,908				2,694				2,328					429	
3.01	Total DI Quantity	703	703	1,567	94	89	207	1,125	39	13	1,849	555	1,050	244	1,635	708	387	540	1,474	267	586	595	26	187	187
3.02	Total DO Quantity	301	301	674	32	33	75	522	9	3	840	297	440	103	772	291	201	280	671	109	244	312	6	50	50
3.03	Total AI Quantity	86	86	303	23	32	46	190	9	3	200	62	109	29	249	130	55	64	165	13	68	78	6	16	16
3.04	Total AO Quantity	5	5	14	1	2	2	9	-	-	10	7	1	2	25	7	16	2	10	2	4	4	-	8	8
3.05	Total FM Quantity	4	4	6	0	0	0	6	-	-	9	4	4	1	13	5	5	3	8	4	1	3	-	0	-
3.06	Total DI SIS Quantity	0	-	0	-	-	-	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-	-	73	73
3.07	Total DO SIS Quantity	0	-	0	-	-	-	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-	-	59	59
3.08	Total AI SIS Quantity	0	-	0	-	-	-	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-	-	32	32
3.09	Total AO SIS Quantity	0	-	0	-	-	-	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-	-	4	4
4	Hardware																								
4.01	PCS Panels/Tiers		1/7, 1/4		1/2	1/3	1/5	1/6, 1/9	1/1	1/1		1/8	1/6, 1/4, 1/3	1/4		1/7, 1/4	1/6	1/8		1/6	1/7	1/9	1/1		1/7
4.02	CMS Panels/Tiers		1/3		-	-	1/1	1/3	-	-		1/3	1/3	1/2		1/3	1/3	1/3		-	1/3	1/3	-		-
4.03	Server Panels/Tiers		2/1		1/1	1/1	1/1	1/2	-	-		1/2	1/2, 1/2	1/2		1/2	1/2	1/2		1/1	2/1	2/1	-		2/1
4.04	LV Panels/Tiers		1/9		1/6	See ALR MP	1/5	1/13	1/1	1/1		1/8	/6, 1/5, 1/13, 1/6	1/5		1/9	1/6	1/4		1/7	1/7	1/9	1/1		1/12
4.05	MV ETM Panels/Tiers		9/1		1/1	See ALR MP	-	8/1	-	-		-	-	-		8/1	-	-		-	5/1	-	-		-
4.06	PCS Workstations/Screens [2]		2/3		1/3	1/3	1/3	2/3	-	-		2/3	2/3, 1/3	1/3		1/3	1/3	1/3		1/3	2/3	2/3	-		1/3

Notes:
1. I/O counts reflect existing signals and do not include spare capacity.
2. PCS Workstations/Screens count based on current OASyS standard.
3. Motorised Block Valve Chamber I/O Count based on PL1 MBV designs.

8. Appendix C: 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

No.	Objective	Objective	Content/Description
			• Implementation guidelines
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, *Works*tation 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 S	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

9. Appendix D: Project Lifecycle Process Deliverables

Intention	Reference	Feasibility Phase Status	Execution Phase Status
1. Execution Planning			
1.1 Project Execution Plan (PEP)	PEP	Final draft	Final
1.2 Project Set-Up	PEP	Finalised	Complete
1.3 Scope of facilities	URS	Approved scope of work	Frozen scope of work
1.4 Contracting strategies	PEP	Final draft	Final
1.5 Quality Management Plan (QMP)	QMP	Final draft	Final
1.6 Health and Safety (H&S) Plan	H&S Plan	Preliminary Plan	Approved
1.7 Owner's interfaces	PEP	Detailed	Final
1.8 Environmental Management Plan (EMP)	EMP	Draft - waste management	Approved
1.9 Engineering Plan	Engineering Plan	Finalised	Finalised
1.10 Procurement and Contracting Plan	PEP	Final Draft	Final
1.11 Commissioning Plan	PEP	Final draft	Final
1.12 Project Controls Plan	PEP	Final draft	Final
1.13 Change Management Plan	PEP	Final draft	Final
1.14 Communication Management Plan (CMP)	Communication Plan/PEP	Final draft	Final
1.15 Project Close-out Plan	PEP	Preliminary Plan	Final
1.16 Lessons learned from previous projects	Lessons learnt report	Reviewed	Revisit
2. Health and Safety (H&S)			
2.1 Project safety leadership	H&S Plan	Cultural value	Cultural value
2.2 Design for safety plan and procedures	PEP	Issued for use	Issued for use
2.3 H&S contractual plan	PEP	Contracting strategy determined	Established and documented
3. Sustainable Development Design			
3.1 Sustainability risks and opportunities register	PEP	Risk register updated	Frozen
3.2 Sustainable procurement	PEP	Pre-qualify vendors	Pre-qualify vendors
4. Process			
4.1 Piping and instrumentation diagrams	P&IDs	Frozen/With holds	Frozen
4.2 Functional Description	URS	Final draft	Frozen
4.3 Hazardous Area Assessment	H&S Plan	Final draft	Frozen
5. Layout			

5.1 Site Plot Plan	Site Plans	Frozen	Detailed

6. Electrical			
6.1 Single line diagrams	Single line diagrams	Frozen	Complete
6.2 Electrical Standard Specifications	Electrical Standard PL631 and PL727	Finalised	Frozen

7. Systems and Process Control			
7.1 Facility Control Philosophy	Software Engineering Design Specifications	Final	Final
7.2 Facility Functional Description	URS/EDS	Detailed	Final
7.3 Control System Architecture	Basic Design Report/URS	Preliminary	Final
7.4 Instrument Specifications	Basic Design Report/URS	Final/Preliminary	Final
7.5 Cable Schedule	Basic Design Report/URS	In Progress	Final
7.6 Instrument List	Basic Design Report/URS	In Progress	Final
7.7 Instrument Data Sheets	Basic Design Report/URS	Final/Preliminary	Final
7.8 DCS/PLC Programming	Basic Design Report/URS	Not started	Final
7.9 Hazardous area dossier	Hazardous area classification report	Final	Final
7.10 Production Information Management System	Basic Design Report/URS	Preliminary	Final
7.11 Other Systems (e.g Metering)	Basic Design Report/URS	Final/Preliminary	Final
7.12 Integration	Basic Design Report/URS	Preliminary	Final

8. Project Execution Systems			
8.1 Project Execution Systems (PES) Plan	PEP	Finalised	Complete
8.2 Project Information Quality Management Plan	PEP	Handover Matrix Developed	Complete and approved
8.3 Project Execution Systems (PES) Procedures	PES	PES Procedures Finalised	PES Procedures Complete

9. Risk			
9.1 Project Risk Management Plan	Risk Management Plan	FEASIBILITY Risk Plan	EXECUTION Risk Plan
9.2 HAZOP	HAZOP Report	Preliminary	Final
9.3 Project and Opportunity register	Risk register	FEASIBILITY Risk register	EXECUTION Risk register
9.4 Risk profiles - Qualitative	Risk Management Plan	FEASIBILITY Risk plan	N/A

9.5 Risk treatment plan	Risk Management Plan	FEASIBILITY treatments	EXECUTION treatments
9.6 Schedule risk profile	Risk Management Plan	FEASIBILITY Schedule risk profile	N/A
9.7 Capital cost risk profile	Risk Management Plan	FEASIBILITY capital risk profile	N/A
9.8 Monitoring review and reporting	Risk Monitoring	As per PEP	As per PEP
9.9 Technical risk management plan	Risk Management Plan	Final for FEASIBILITY	N/A

10. Schedule			
10.1 Project master schedule	Master Schedule	Level 3	Detailed Level 3
10.2 Engineering schedule	Bid returnables	Level 3 Detailed	Level 3 and 4 Detail
10.3 Procurement schedule	PEP	All packages	Level 3 Detail
10.4 Commissioning/Start-up schedule	PEP	Level 2	Level 3 Detail

11. Procurement			
12.1 Procurement objectives	PEP	Baseline plan	Update plan
12.2 Procurement and Contract Plan	PEP	Baseline plan	Update plan
12.3 Package and contract list	PEP	Baseline plan	Update plan
12.4 Supplier quality plan	QMP	Baseline plan	Update plan
12.5 Enquiry documentation	Enquiry Documents	Final	Complete

13. Commissioning			
13.1 Commissioning Start-up Plan	PEP	Not Started	Final

14. Value Improving Processes			
14.1 Technology selection	Basic Design Report/URS	Complete	Complete
14.2 Design-to-Capacity (fit for purpose design)	Basic Design Report/URS	Complete	Complete
14.3 Value Engineering – Project Value Analysis (PVA)	Basic Design Report/URS	Full PVA	Complete
14.4 Standardisation	Basic Design Report/URS	Frozen	Complete
14.5 Customised Standards and Specifications	Basic Design Report/URS	Frozen	Complete
14.6 Facility spares	Basic Design Report/URS	Preliminary	Complete

15. Quality			
15.1 Quality (Execution) Management Plan	Quality Management Plan	Final - ready to deploy to EXECUTION	Revised as required

15.2 *Contractor* quality requirements	Quality Management Plan	Preliminary	Finalised
15.3 Budget man hours	Man hour Cost Estimation	Finalised for phase	Revised as required
15.4 Establish quality requirements and risks	Quality Management Plan/PEP	Finalised at end of FEASIBILITY Set-up	Finalised at end of EXECUTION Set-up
15.5 Continuous improvement	Quality Management Plan	Finalised for phase	Finalised for phase
15.7 Project QA/QC function performance	Quality Management Plan	Finalised for phase	Finalised
15.6 Project objectives	PEP	Defined	Defined

16. Operational Readiness (OR)			
16.1 OR Business requirements	Operational Readiness Plan	Finalised at phase end by owner	Validate and finalise at phase start
16.2 OR Human resource plan (including training)	Operational Readiness Plan	Finalise at phase end	Validate, finalise and execute at phase start
16.3 OR design influences	Operational Readiness Plan	Validation at phase start, finalized at phase end	Validate, finalise and execute at phase start
16.4 OR Operational preparedness	Operational Readiness Plan	Validated and define by phase end	Validate, finalise and execute