



Contract JW13897
NORTHERN WASTEWATER TREATMENT WORKS:
EXPANSION OF CAPACITY UNIT 5 – INSTALLATION OF
MECHANICAL AND ELECTRICAL EQUIPMENT



TENDER COVER PAGE

MBD 1

YOU ARE HEREBY INVITED TO BID FOR REQUIREMENTS OF JOHANNESBURG WATER

BID NUMBER: JW13897

CLOSING DATE: 12 SEPTEMBER 2025

CLOSING TIME: 10:30 AM

DESCRIPTION: NORTHERN WASTEWATER TREATMENT WORKS: EXPANSION OF CAPACITY UNIT 5 –
INSTALLATION OF MECHANICAL AND ELECTRICAL EQUIPMENT

CIDB REQUIREMENTS: TENDERERS SHOULD HAVE A CONTRACTOR CIDB GRADING OF 9ME

BRIEFING SESSION	COMPULSORY
BRIEFING DETAILS	DATE AND TIME: 14 AUGUST 2025 AT 13:00 PM ADDRESS: NORTHERN WASTEWATER TREATMENT WORKS VENUE: ADMINISTRATION BUILDING-MAIN BOARDROOM TENDERS RECEIVED FROM NON-ATTENDED BIDDERS OF A COMPULSORY BRIEFING SESSION WILL NOT BE ACCEPTED
TENDER SUBMISSION DETAILS	BID DOCUMENTS MUST BE DEPOSITED IN THE TENDER BOX SITUATED AT GROUND FLOOR IN JOHANNESBURG WATER ADDRESS: TURBINE HALL, 65 NTEMI PILISO STREET, NEWTOWN, JOHANNESBURG, 2001 PLEASE ALLOW SUFFICIENT TIME TO ACCESS JOHANNESBURG WATER OFFICES IN TURBINE HALL AND DEPOSIT YOUR TENDER DOCUMENT IN THE JOHANNESBURG WATER TENDER BOX SITUATED AT RECEPTION BEFORE TENDER CLOSING TIME. TIMES: THE BUILDING WILL OPEN 7 DAYS A WEEK FROM 06:00 UNTIL 18:00

BIDDER INFORMATION				
NAME OF BIDDER				
POSTAL ADDRESS				
PHYSICAL ADDRESS				
TELEPHONE NUMBER				
CELLPHONE NUMBER				
E-MAIL ADDRESS				
VAT REGISTRATION NUMBER				
TAX COMPLIANCE STATUS	TCS PIN		MAAA No	
OTHER STATUS	COIDA Registration No		CIDB No	

EMPLOYER INFORMATION			
DEPARTMENT	CAPEX	DEPARTMENT	SCM
CONTACT PERSON	Thapelo Teane	CONTACT PERSON	Nthabiseng Matabane
TELEPHONE NUMBER	011 688 6615	TELEPHONE NUMBER	011 688 1512
E-MAIL ADDRESS	thapelo.teane@jwater.co.za	E-MAIL ADDRESS	nthabiseng.matabane@jwater.co.za

Employer:		Contractor:	
Witness:		Witness:	



Contract JW13897

**NORTHERN WASTEWATER TREATMENT WORKS:
EXPANSION OF CAPACITY UNIT 5 – INSTALLATION OF
MECHANICAL AND ELECTRICAL EQUIPMENT**



NOTE:DOCUMENTS DOWNLOADED FROM THE ETENDER PORTAL IS AT NO COST BUT MUST COMPLY WITH SUBMISSION REQUIREMENTS.

WITHOUT LIMITATION, JOHANNESBURG WATER TAKES NO RESPONSIBILITY FOR ANY DELAYS IN ANY COURIER OR POSTAL SYSTEM OR ANY LOGISTICAL DELAYS WITHIN THE PREMISES OF JOHANNESBURG WATER. JOHANNESBURG WATER LIKEWISE TAKES NO RESPONSIBILITY FOR OFFERS DELIVERED TO A LOCATION OTHER THAN THE TENDER BOX AS PER THE TENDER SUBMISSION DETAILS STATED IN THE TENDER. PROOF OF POSTING OR OF COURIER DELIVERY WILL NOT BE TAKEN BY JOHANNESBURG WATER AS PROOF OF DELIVERY. TENDER SUBMISSION DOCUMENTS MUST BE IN THE BOX BEFORE TENDER CLOSURE.

The current Johannesburg Water Supply Chain policy is applicable which is available on the JW website www.johannesburgwater.co.za

THE TENDERER IS ENCOURAGED TO SIGN THE TENDER SUBMISSION REGISTER WHEN SUBMITTING THEIR TENDERS.

**PLEASE ENSURE YOU SUBMIT 1 x ORIGINAL TENDER HARD DOCUMENT
(IF PRACTICAL, ALSO PROVIDE AN ELECTRONIC COPY IN A MEMORY STICK/USB TO ENSURE INFORMATION IS NOT MISSED WHEN TENDERS ARE BEING EVALUATED BY THE BID EVALUATION COMMITTEE – NON-SUBMISSION OF ELECTRONIC COPY AND MEMORY STICK/USB WILL NOT LEAD TO DISQUALIFICATION).**

Any documents required that are not submitted in the tender box at the deadline will be considered late.

The tenderer accepts that Johannesburg Water will not take responsibility for the misplacement or premature opening of the tender if the outer package is not sealed and marked as stated.

NB: NO BIDS WILL BE CONSIDERED FROM PERSONS IN THE SERVICE OF THE STATE.

NAME OF CONTACT PERSON:

SIGNATURE OF BIDDER:

CAPACITY UNDER WHICH THIS BID IS SIGNED:

DATE:

Employer:		Contractor:	
Witness:		Witness:	



Contract JW13897

**NORTHERN WASTEWATER TREATMENT WORKS:
EXPANSION OF CAPACITY UNIT 5 – INSTALLATION OF
MECHANICAL AND ELECTRICAL EQUIPMENT**



TERMS AND CONDITIONS FOR BIDDING

1. BID SUBMISSION:

- 1.1. BIDS MUST BE DELIVERED BY THE STIPULATED TIME TO THE CORRECT ADDRESS. LATE BIDS WILL NOT BE ACCEPTED FOR CONSIDERATION.
- 1.2. **ALL BIDS MUST BE SUBMITTED ON THE OFFICIAL FORMS PROVIDED (NOT TO BE RE-TYPED) OR ONLINE**
- 1.3. THIS BID IS SUBJECT TO THE PREFERENTIAL PROCUREMENT POLICY FRAMEWORK ACT AND THE PREFERENTIAL PROCUREMENT REGULATIONS, 2022, THE GENERAL CONDITIONS OF CONTRACT (GCC) AND, IF APPLICABLE, ANY OTHER SPECIAL CONDITIONS OF CONTRACT.

2. TAX COMPLIANCE REQUIREMENTS

- 2.1 BIDDERS MUST ENSURE COMPLIANCE WITH THEIR TAX OBLIGATIONS.
- 2.2 BIDDERS ARE REQUIRED TO SUBMIT THEIR UNIQUE PERSONAL IDENTIFICATION NUMBER (PIN) ISSUED BY SARS TO ENABLE THE ORGAN OF STATE TO VIEW THE TAXPAYER'S PROFILE AND TAX STATUS.
- 2.3 APPLICATION FOR THE TAX COMPLIANCE STATUS (TCS) CERTIFICATE OR PIN MAY ALSO BE MADE VIA E-FILING. IN ORDER TO USE THIS PROVISION, TAXPAYERS WILL NEED TO REGISTER WITH SARS AS E-FILERS THROUGH THE WEBSITE WWW.SARS.GOV.ZA.
- 2.4 FOREIGN SUPPLIERS MUST COMPLETE THE PRE-AWARD QUESTIONNAIRE IN PART B:3.
- 2.5 BIDDERS MAY ALSO SUBMIT A PRINTED TCS CERTIFICATE TOGETHER WITH THE BID.
- 2.6 IN BIDS WHERE CONSORTIA / JOINT VENTURES / SUB-CONTRACTORS ARE INVOLVED; EACH PARTY MUST SUBMIT A SEPARATE TCS CERTIFICATE / PIN / CSD NUMBER.
- 2.7 WHERE NO TCS IS AVAILABLE BUT THE BIDDER IS REGISTERED ON THE CENTRAL SUPPLIER DATABASE (CSD), A CSD NUMBER MUST BE PROVIDED.

3. QUESTIONNAIRE TO BIDDING FOREIGN SUPPLIERS

- 3.1. IS THE ENTITY A RESIDENT OF THE REPUBLIC OF SOUTH AFRICA (RSA)? ☐ YES ☐ NO
- 3.2. DOES THE ENTITY HAVE A BRANCH IN THE RSA? ☐ YES ☐ NO
- 3.3. DOES THE ENTITY HAVE A PERMANENT ESTABLISHMENT IN THE RSA? ☐ YES ☐ NO
- 3.4. DOES THE ENTITY HAVE ANY SOURCE OF INCOME IN THE RSA? ☐ YES ☐ NO
- 3.5. IS THE ENTITY LIABLE IN THE RSA FOR ANY FORM OF TAXATION? ☐ YES ☐ NO

IF THE ANSWER IS "NO" TO ALL OF THE ABOVE, THEN IT IS NOT A REQUIREMENT TO REGISTER FOR A TAX COMPLIANCE STATUS SYSTEM PIN CODE FROM THE SOUTH AFRICAN REVENUE SERVICE (SARS) AND IF NOT REGISTER AS PER 2.3 ABOVE.

NB: FAILURE TO PROVIDE ANY OF THE ABOVE PARTICULARS MAY RENDER THE BID INVALID.

Employer:		Contractor:	
Witness:		Witness:	



CONTRACT:JW13987
NORTHERN WASTEWATER TREATMENT WORKS
EXPANSION OF CAPACITY UNIT 5 – INSTALLATION OF
MECHANICAL AND ELECTRICAL EQUIPMENT



Tender notice and invitation to tender

1. TENDER NOTICE AND INVITATION TO TENDER

Johannesburg Water (SOC) Ltd invites the tenderer for the following:

**CONTRACT NO: JW13897 NORTHERN WASTEWATER TREATMENT WORKS: EXPANSION OF
CAPACITY UNIT 5 – INSTALLATION OF MECHANICAL AND ELECTRICAL EQUIPMENT**

The tender document will be available in the form of a download from the Johannesburg Water website (www.johannesburgwater.co.za/supply_chain/tenders) starting from 04 August 2025.

The Employer is **Johannesburg Water (SOC) Ltd**

All tenders and supporting documents must be sealed and be placed in the Tender box on the ground floor of Johannesburg Water by no later than 10:30 am on 12 September 2025.

Address is as follows:

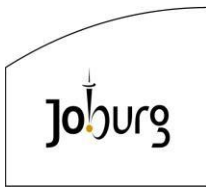
TURBINE HALL, 65 NTEMI PILISO STREET, NEWTOWN, JOHANNESBURG, 2001

The Employer is not obliged to accept the lowest or any tender and reserve the right to appoint:

- a) in whole or in part.
- b) to more than one tenderer.
- c) to the highest points scoring bidder.
- d) to the lowest acceptable tender or highest acceptable tender in terms of the point scoring system.
- e) to a bidder not scoring the highest points (based on objective grounds in terms of section 2 (1) (f) of the PPPFA) (where applicable).
- f) not to consider any bid with justifiable reasons.

A valid and binding contract with the successful tender/s will be concluded once the Employer has awarded the contract. The Employer will issue an appointment letter to the successful tenderer.

Employer:		Contractor:	
Witness:		Witness:	



CONTRACT: JW13897
NORTHERN WASTEWATER TREATMENT WORKS
EXPANSION OF CAPACITY UNIT 5 – INSTALLATION OF
MECHANICAL AND ELECTRICAL EQUIPMENT



Volume 1 Tender and Contract
Section T1 Tender and Contract

Johannesburg Water SOC Ltd



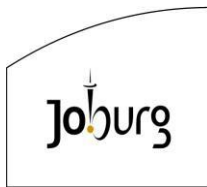
CONTRACT NO: JW13897

**NORTHERN WASTEWATER
TREATMENT WORKS**

**EXPANSION OF CAPACITY UNIT 5 –
INSTALLATION OF MECHANICAL
AND ELECTRICAL EQUIPMENT**

**VOLUME 1
TENDER AND CONTRACT**

Employer:		Contractor:	
Witness:		Witness:	



**CONTRACT NO JW13897
NORTHERN WASTEWATER TREATMENT WORKS
EXPANSION OF CAPACITY UNIT 5 – INSTALLATION OF
MECHANICAL AND ELECTRICAL EQUIPMENT**



**Volume 1 Tender and Contract
Section T1 Tender and Contract**

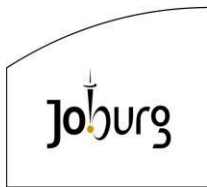
The Tenderer is to indicate in the “Submitted (Yes/No)” column in the below table that they have completed the required section of the tender document. Completion of this checklist will assist the Tenderer in ensuring that they have attended to all the required items for submission with this tender. Additionally, it is an absolute requirement that tenderers comply with National Treasury’s CSD registration as well as SARS tax compliance requirements for contract award – refer T2.2.4. The below will form part of the tender document, the tenderers are therefore encouraged to submit the returnable and or documentation with their tender offer to avoid elimination especially with regards to what is stated in the Required for Tender Evaluation column or not obtaining points for Specific Goals. Tenderers are encouraged to ensure that their Tax status remains Tax Compliant on CSD throughout the process to avoid delaying the process or being eliminated at award stage. For infrastructure related projects. Tenderer must have a CIDB Active Status at the requested CIDB requirement at evaluation stage to avoid disqualification.

All documentation listed in the Checklist below shall form part of the Contract.

Table 1

Ref	Description of Returnable/s or Documentation that will form Part of Contract and must therefore to be Completed and / or Submitted by the Tenderer	Required for Tender Evaluation	Required for Tender Award	Required After Tender Award	Submitted (Yes/No)
1	Tender Cover:				
	Name of Tender	•			
	Contact Person	•			
	Telephone Number	•			
	Central Supplier Database Registration	•			
	CIDB Registration Number	•			
	COIDA Registration Number			•	
	Tax SARS PIN No.		•		
	MAAA No. for Tax Compliant Status		•		
2	Mandatory Documents at Particular Stage:				
	CIDB grading of 9ME or higher. Active Status at the required CIDB grading or higher at the time of Evaluation.	•			
	Mandatory Tender Briefing Meeting	•			
	Complete and sign the Form of Offer	•			
3	Administrative Documentation:				
T2.1.1	Record of Addenda to Tender Documents	•			
T2.1.2	Signed Certificate of Authority to Sign	•	•		
T2.1.3	Compulsory Enterprise Questionnaire	•			
	MBD 1 - Invitation to Bid - Completed and signed	•	•		

Employer:		Contractor:	
Witness:		Witness:	



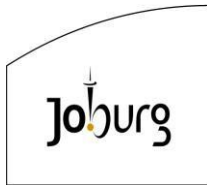
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EXPANSION OF CAPACITY UNIT 5 – INSTALLATION OF
MECHANICAL AND ELECTRICAL EQUIPMENT**



**Volume 1 Tender and Contract
Section T1 Tender and Contract**

Ref	Description of Returnable/s or Documentation that will form Part of Contract and must therefore to be Completed and / or Submitted by the Tenderer	Required for Tender Evaluation	Required for Tender Award	Required After Tender Award	Submitted (Yes/No)
	Central Supplier Database Registration	•			
T2.1.4	MBD 4 - Declaration of interest - Completed and signed	•	•		
T2.1.4	MBD 5 - Declaration for procurement above R10 Million (all applicable taxes included) Completed and signed.	•	•		
T2.1.4	MBD 6.1 - Preference Points Schedule – Specific Goals and Price Points - Completed and signed.	•			
T2.2.4	MBD 8 - Bidder's past supply chain management practices – Completed and signed.	•	•		
T2.2.4	MBD 9 - Certificate of Independent Bid Determination – Completed and signed.	•	•		
	Municipal Rates and Taxes for the Company - Current municipal rates for the company not older than 90 days (if leasing/renting, submitted proof such as lease agreement where premises are rented), OR Confirmation that suitable arrangements are in place for arrear municipal obligations with your local municipality OR Current municipal rates which is not older than 90 days or valid lease agreement with affidavit from owner of property in cases stated in Proof of Good Standing with Regards to Municipal Accounts document in the Tender.	•	•		
	Municipal Rates and Taxes - Current municipal rates for the directors of the entity not older than 90 days (if leasing/renting, submitted proof such of lease agreement where premises are rented), OR Confirmation that suitable arrangements are in place for arrear municipal obligations with your local municipality OR Current municipal rates which is not older than 90 days or valid lease agreement with affidavit from owner of property in cases	•	•		

Employer:		Contractor:	
Witness:		Witness:	



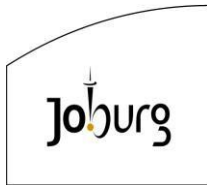
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EXPANSION OF CAPACITY UNIT 5 – INSTALLATION OF
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Volume 1 Tender and Contract
Section T1 Tender and Contract

Ref	Description of Returnable/s or Documentation that will form Part of Contract and must therefore to be Completed and / or Submitted by the Tenderer	Required for Tender Evaluation	Required for Tender Award	Required After Tender Award	Submitted (Yes/No)
	stated in Proof of Good Standing with Regards to Municipal Accounts document in the Tender.				
	3-year financial statements (audited where applicable)	•	•		
	Any qualifications. If "Yes", reference to such qualification/s must be indicated on a cover letter. Please be aware that qualification on the tender document may result in your tender being eliminated as the qualification may impede on the ability to evaluate like with like.	•			
T2.1.5	Proposed Amendments and Qualifications	•			
T2.3.4	Imported Content Sheet: Forward Exchange Cover for Imported	•			
4.	Functionality Documentation:				
	Documentary Evidence Required for Criteria 1 (Contactable Reference Letters and Completion / Final Approval Certificates)	•			
	Documentary Evidence Criteria 2 – (Contactable Reference Letters and Completion / Final Approval Certificates)	•			
	Documentary Evidence Criteria 3 – Contactable Reference Letters and Completion / Final Approval Certificates)	•			
	Documentary Evidence Criteria 4 – (CV, qualifications)	•			
	Documentary Evidence Criteria 5 – (CV, qualifications, and valid registration)	•			
	Documentary Evidence Criteria 6 – (Page/pages of specific Method)	•			
5.	Specific Goals:				
	Documentary Evidence Required for Criteria 1 – (Valid Construction Sector BBEE Certificate issued by SANAS	•			

Employer:		Contractor:	
Witness:		Witness:	



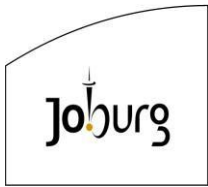
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EXPANSION OF CAPACITY UNIT 5 – INSTALLATION OF
MECHANICAL AND ELECTRICAL EQUIPMENT**



**Volume 1 Tender and Contract
Section T1 Tender and Contract**

Ref	Description of Returnable/s or Documentation that will form Part of Contract and must therefore to be Completed and / or Submitted by the Tenderer	Required for Tender Evaluation	Required for Tender Award	Required After Tender Award	Submitted (Yes/No)
	accredited verification agency or DTI/CIPC BBBEE Certificate for Exempted Micro Enterprises or Affidavit sworn under oath, OR CIPC registration document showing percentage of ownership and share certificate where applicable)				
	Documentary Evidence Required for Criteria 2 – (Proof of municipal account / valid lease agreement, letter from the Ward Council confirming the business address. Businesses that operate from personal properties are required to submit an affidavit)	•			
6.	Pricing Schedule:				
	Bill of Quantities/ Schedule of Quantities. completed	•			
	Alterations authenticated – Refer to Acknowledgment of Tender Conditions	•			
7.	Pricing Schedule:				
	Bill of Quantities/ Schedule of Quantities. completed in accordance with the award strategy	•			
	Alterations authenticated – Refer to Conditions of Tender	•			
8.	Site Information:				
	Site Information	•			
9.	Occupational Health, Safety and Environmental Specification				
T2.3.1	Acknowledgement of SHE Specification & Annexures	•			
10.	Tender Drawings:				
T2.3.2	Acknowledgement of Project Tender Drawings	•			
11.	Terms and Conditions:				
	General Conditions of Contract	•			
	Special Conditions	•			
	Tender Data	•			
12.	Other Documents				
	Form of Acceptance (do not complete will only be completed after award)			•	
	Public Liability Insurance			•	
	Insurance of Works			•	
	Common Law Liability Insurance			•	
	Insurance of Construction Plant and			•	

Employer:		Contractor:	

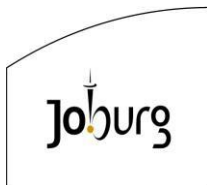


CONTRACT NO JW13897
NORTHERN WASTEWATER TREATMENT WORKS
EXPANSION OF CAPACITY UNIT 5 – INSTALLATION OF
MECHANICAL AND ELECTRICAL EQUIPMENT



Volume 1 Tender and Contract
Section T1 Tender and Contract

Witness:		Witness:	



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NORTHERN WASTEWATER TREATMENT WORKS
EXPANSION OF CAPACITY UNIT 5 – INSTALLATION OF
MECHANICAL AND ELECTRICAL EQUIPMENT



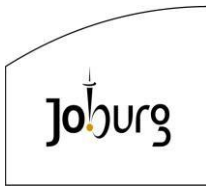
Volume 1 Tender and Contract
Section T1 Tender and Contract

Ref	Description of Returnable/s or Documentation that will form Part of Contract and must therefore to be Completed and / or Submitted by the Tenderer	Required for Tender Evaluation	Required for Tender Award	Required After Tender Award	Submitted (Yes/No)
	Equipment				
	Valid Registration with Compensation for Occupation Injuries and Diseases Act			•	
	Performance Guarantee			•	
	Comprehensive Health and Safety Plan (compliance with OHSE Specification - if applicable)			•	
	Bank Details Form			•	

Tenderers will be notified of any omitted, outstanding, missing and or incomplete administrative documents and will be offered a period of 3 days to complete or submit those pages i.e., Municipal Bidding Documents (MBD), authority to sign and other administrative documents that require completion and signatures. These exclude documentation on functionality, price, and preference points for specific goals. Tenders that are received contrary to the above requirements will be disqualified after three (3) days period has lapsed. If locality is a specific goal in MBD6.1 – the requested documentation may not be used to allocate points for specific goals.

Signature: _____ Date _____

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW13897
Northern Wastewater Treatment Works
Expansion of Capacity Unit 5 – Installation of
Mechanical and Electrical Equipment



Volume 1 Tender and Contract
Section T1 Tendering Procedures

Johannesburg Water (SOC) Ltd



CONTRACT NO. JW13897

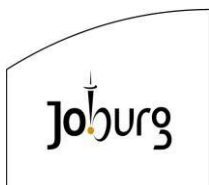
NORTHERN WASTEWATER TREATMENT WORKS

**EXPANSION OF CAPACITY UNIT 5 – INSTALLATION
OF MECHANICAL AND ELECTRICAL EQUIPMENT**

VOLUME 1

TENDERING PROCEDURES

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW13897
Northern Wastewater Treatment Works
Expansion of Capacity Unit 5 – Installation of
Mechanical and Electrical Equipment

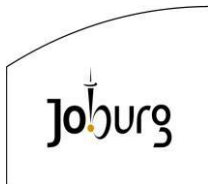


Volume 1 Tender and Contract
Section T1 Tendering Procedures

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Employer:		Contractor:	
Witness:		Witness:	



T1.1 TENDER DATA

T1.1.1 Conditions of Tender

The conditions of tender are the Standard Conditions of Tender as contained in Annex C of the CIDB Standard for Uniformity in Construction Procurement (August 2019). (See www.cidb.org.za).

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

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

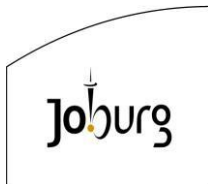
T1.1.2 Tender Data

The clause numbers in the Tender Data refer to the corresponding clause numbers in the Conditions of Tender.

The additional Conditions of Tender are:

Clause number	Tender Data
C.1.1	The Employer is, Johannesburg Water (SOC) Limited
C.1.2	The tender documents issued by the Employer comprise: Volume 1 Tender Part 1: Tendering Procedures T1.1 Tender Notice and Invitation to Tender T1.2 Tender Data Tender Part 2: Returnable Documents T2.1: List of Returnable Documents, including the Enterprise Declaration Affidavit which may be bound in a separate volume. T2.2: List of Other Returnable Documents T2.3: List of Other Returnable Schedules Contract Part 1: Agreement and Contract Data C1.1 Form of Offer and Acceptance C1.2 Contract Data C1.3 Forms of Securities Contract Part 2: Pricing Data C2.1 Pricing Instructions C2.2 Bill of Quantities/Schedule of Rates Volume 2A Contract Part 3: Scope of Work C3.1 Scope of Work

Employer:		Contractor:	
Witness:		Witness:	



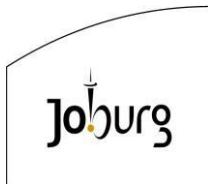
Contract: JW13897
Northern Wastewater Treatment Works
Expansion of Capacity Unit 5 – Installation of
Mechanical and Electrical Equipment



Volume 1 Tender and Contract
Section T1 Tendering Procedures

Clause number	Tender Data
	C3.2 Particular Specifications Contract Part 4: Site Information C4 Site Information Volume 2B Generic Specifications Volume 3 Occupational Health, Safety and Environmental Specification and Environmental Management Plan Volume 4 Tender Drawings
C.1.4	The Employer's representative is: Contact Person: Mr Thapelo Teane Telephone: 011 688 6615 E-mail address: thapelo.teane@jwater.co.za The SCM representative is: Contact Person: Gcina Ndela Telephone: 011 688 1796 E-mail address: nthabiseng.matane@jwater.co.za
C.2.1	Eligibility criteria and requirements CIDB registration and grading: 1) Only tenderers who are registered with the CIDB and were capable of being so prior to the evaluation of submissions, in a contractor grading designation equal to or higher than a contractor grading designation determined in accordance with the sum tendered for an 9ME class of construction work, are eligible to submit tenders. Tenders must have an Active status at the required CIDB grading at time of tender evaluation for the bidder to meet the eligibility criteria and requirement. 2) Joint ventures are eligible to submit tenders provided that: - Every member of the joint venture is registered with the CIDB; and - The combined contractor grading designation calculated in accordance with the CIDB Regulations is equal to or higher than a contractor grading designation determined in accordance with the sum tendered for an 9ME class of construction work. Failure to meet to Eligibility criteria and requirements will result in disqualification.

Employer:		Contractor:	
Witness:		Witness:	



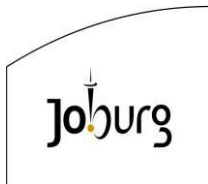
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Northern Wastewater Treatment Works
Expansion of Capacity Unit 5 – Installation of
Mechanical and Electrical Equipment



Volume 1 Tender and Contract
Section T1 Tendering Procedures

Clause number	Tender Data
C.2.8	Replace the contents of the clause with the following: “Request clarification of the tender documents, if necessary, by notifying the Employer’s Officials indicated on the Tender Notice and Invitation to Tender in writing at least seven (7) working days before the closing time stated in the foregoing notice.
C.2.10.5	Add the following to the clause: “A price or rate is to be entered against each item in the Bill of Quantities, whether the quantities are stated or not. An item against which no price is entered will be considered to be covered by the other prices in the Schedule.”
C.2.11	The evaluation on price alteration will be conducted as follows: Where the tender award strategy is to evaluate and award per item or category, the following must apply: - If there is an alteration on the rate but no alteration on the total for the item or category, the bidder will not be disqualified. - If there is an alteration on the total for the item/s without authentication, bidders will only be disqualified for alteration per item or category. Where the tender award strategy is to evaluate and award total bid offer, the following must apply: - If there is an alteration on the rate, total for the line item, sub-total/ sum brought/carried forward for the section but no alteration on the total bid offer, the bidder will not be disqualified. - If there is an alteration on the total bid offer on form of offer, then the amount in words must be considered or vice-versa. - If there is an unauthenticated alteration on the total bid offer and the amount in words is not authenticated, the bidders will be disqualified for the entire tender. Where the tender pricing schedule or bill of quantities is requesting rates/price from bidder/s without providing a total, the following will apply: (i) If there is an unauthenticated alteration on the unit rate/price the bidder must be disqualified. Corrections may not be made using correction fluid, correction tape or the like, bid received contrary to this will be disqualified.
C.2.12.1	Replace Contents Alternative offers will not be permitted.
C.2.13.3	Each tender offer shall be submitted as an original. Tenderers are also requested to submit a soft copy in a USB (Tenderers who do not submit a soft copy will not be disqualified)
C.2.13.5	The Employer’s address for delivery of tender offers and identification details to be shown on the Tenderer’s offer package are:

Employer:		Contractor:	
Witness:		Witness:	



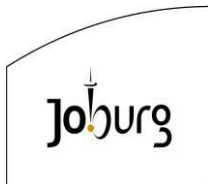
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Volume 1 Tender and Contract
Section T1 Tendering Procedures

Clause number	Tender Data
	Location of Tender Box: Ground Floor Entrance Physical address: Johannesburg Water (SOC) Ltd Turbine Hall 65 Ntemi Piliso Street Newtown Johannesburg 2001 Identification details: Tender reference number, Title of Tender and the closing date and time of the tender, as well as the Tenderer's name, their Authorised Representative's name, postal address and telephonic contact numbers.
C.2.13.6 & C.3.5	A two-envelope procedure will not be followed.
C.2.15.1	The closing time for submission of tender offers is as stated in the Tender Notice and Invitation to Tender.
C.2.16	The tender offer validity period is 150 days.
C.2.16.1	Add the following to the clause: "If the tender validity expires on a Saturday, Sunday or public holiday, the Tender Offer shall remain valid and open for acceptance until the closure of business on the following working day."
C.2.19	The Tenderer must provide access during working hours to his premises for inspections on request.
C.2.23	The Tenderer is required to submit with his tender: - Valid SARS Compliance status Pin for Tenders issued by the South African Revenue Services. - Proof of CSD registration i.e. MA number - A Certificate of Contractor Registration issued by the CIDB. - Where the tendered amount inclusive of VAT exceeds R 10 million: - Audited annual financial statement for 3 years, or for the period since establishment if established during the last 3 years, if required by law to prepare annual financial statements for auditing. - If the bidder is not required by law to prepare financial statements, then the bidder is required to submit their unaudited financial statements prepared by an independent accounting professional. - Proof that the Tenderer and directors of the Tenderer are not in arrears for more than 90 days with municipal rates and taxes and municipal service charges, The latest municipal account is to be attached, or a signed copy of the valid lease agreement if the

Employer:		Contractor:	
Witness:		Witness:	



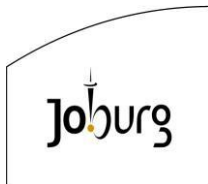
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Clause number	Tender Data
	Tenderer or director of the Tenderer is currently leasing premises and not responsible for paying municipal accounts. i. Should the municipal statement that was submitted with the tender document before tender closing date and time be in arrears for more than 90 days at time of award, the tenderer will be requested to submit the latest municipal statement which shows that the Tenderer is not in arrears for more than 90 days. If the statement at that time is in arrears for more than 90 days, the Tenderer must submit before the stipulated deadline, the written proof of an approved arrangement with the municipality. ii. The proof may be a copy of the agreement or an updated municipal statement which reflects the arrangement. iii. Should this tender be considered for award of the contract, based on proof of submission and should proof of such submission be found to be invalid, erroneous or inaccurate, the tenderer will no longer be considered for the award of the contract. iv. Statement must not be older than 90 days from the closing date of this tender. Attach latest municipal account statement behind this page. v. In cases where the director of the tenderer resides with their spouse, parent, partner or sibling the owner of the property that confirm where the director of the tenderer resides must submit an affidavit stating such and explaining the relationship. This would happen in the case where the submitted municipal statement or lease agreement is not in the name of the director of the tenderer. Point (i) will be applicable. vi. In cases where the business address of the tenderer is also the official residence of the director of the tenderer, the director of the tenderer must submit an affidavit stating such. Proof that the municipal statement is not in arrears for more than 90 days or a valid lease agreement must be submitted. Point (i) will be applicable. 6) Where a Tenderer satisfies CIDB contractor grading designation requirements through joint venture formation, such Tenderers must submit the Certificates of Contractor Registration in respect of each partner.
C.2.24	Add the following new clause: Canvassing and obtaining of additional information by Tenderers Accept that: 1. No Tenderer shall make any attempt either directly or indirectly to canvass any of the Employers officials or the Employer's agent in respect of his tender, after the opening of the tenders but prior to the Employer arriving at a decision thereon. 2. No Tenderer shall make any attempt to obtain particulars of any relevant information, other than that disclosed at the opening of tenders.
C.2.25	Add the following new clause: Prohibitions on awards to persons in service of the state

Employer:		Contractor:	
Witness:		Witness:	



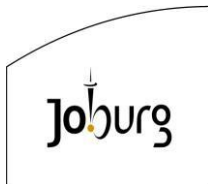
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Clause number	Tender Data
	Accept that the Employer is prohibited to award a tender to a person - a) who is in the service of the state; or b) if that person is not a natural person, of which any director, manager, principal shareholder or stakeholder is a person in the service of the state; or c) a person who is an advisor or consultant contracted with the municipality or municipal entity “In the service of the state” means to be - i. a member of: - • any municipal council. • any provincial legislature; or • the National Assembly or the National Council of Provinces. ii. a member of the board of directors of any municipal entity. iii. an official of any municipality or municipal entity. iv. an employee of any national or provincial department. v. provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act No.1 of 1999). vi. a member of the accounting authority of any national or provincial public entity; or vii. an employee of Parliament or a provincial legislature.” In order to give effect to the above, the questionnaire for the declaration of interests in the tender of persons in service of state in Section T2.1 must be completed.
C.2.26	Add the following new clause: Awards to close family members of persons in the service of the state Accept that the notes to the Employer’s annual financial statements must disclose particulars of any award of more than R 2 000 to a person who is a spouse, child or parent of a person in the service of the state (defined in clause C.2.25), or has been in the service of the state in the previous twelve months, including a. the name of that person; b. the capacity in which that person is in the service of the state; and c. the amount of the award. To give effect to the above, the questionnaire for the declaration of interests in the tender of persons in service of state in part T2 – Returnable Documents must be completed in full and signed.”

Employer:		Contractor:	
Witness:		Witness:	



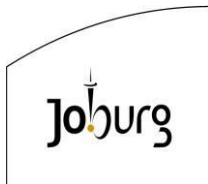
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Clause number	Tender Data
C.2.27	Add the following new clause: Tax Compliance In the case of a Joint Venture/Consortium the tax Compliance status Pin must be submitted for each member of the Joint Venture/Consortium.”
C.2.28	Add the following new clause: i. Tenderers will be notified of any omitted, outstanding, missing and or incomplete administrative documents and will be offered a period of 3 days to complete or submit those pages i.e., Municipal Bidding Documents (MBD), authority to sign and other administrative documents that require completion and signatures. These exclude documentation on functionality, price and preference points for specific goals. ii. Tenders that are received contrary to the above requirements will be disqualified after three (3) days period has lapsed. iii. In cases where locality is a specific goal and the bidder did not submit the required documentation, the tenderer upon submitting the municipal statement, lease agreement or letter from ward councilor confirming business address as per above, may not be eligible for points under specific goals if such documentation was not submitted with the tender document.
C.3.2	Replace the contents of the clause with the following: “If necessary, issue addenda that may amend or amplify the tender documents to each tenderer during the period from the date that tender documents are available until seven (7) calendar days before the tender closing time stated in the Tender Data. If, as a result a tenderer applies for an extension to the closing time stated in the Tender Data, the Employer may grant such extension and, shall then notify all tenderers who collected tender documents.”
C.3.4.2	Tenders will be opened in public soon after closing time and recording of received documents but not later than 11:00 at the tender office located at Turbine Hall, 65 Ntemi Piliso, Newtown, 2001, Ground Floor. Tenderers’ names and total prices, where practical will be, read out.

Employer:		Contractor:	
Witness:		Witness:	



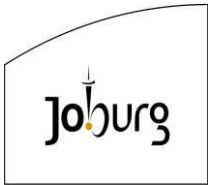
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C.3.9	Replace Existing Clause Arithmetic Errors Construction related tenders JW undertakes to check the highest scoring bid for arithmetical errors and correcting them as follows: JW shall check for arithmetic errors using the following sequence: - Check the amount in words against the amount in figures on the <i>Form of Offer</i>, - Check the Form of Offer against the Summary Schedule Total, - Check the Section Sub-Totals per section against the Summary Total for summation errors, - Check the Section Sub-Totals in the Summary Schedule against Section Sub-Totals in the Bill of Quantities. - Check the Section Sub-Totals against the Item Totals for summation errors. - Check the Item Totals against the product of the Item Rate and the Quantity Provided. If a bill of quantities or price schedule applies JW will request the bidder to correct the arithmetic errors as follows: - In respect of the Form of Offer, where there is a discrepancy between the amounts in figures and the amount in words, the amount in words shall govern. The bidder must be requested to adjust the amount in figures to correspond with the amount in words. JW will notify the tenderer of all errors or omissions that are identified in the tender offer and either request the tenderer to confirm the offer as tendered or JW will accept the corrected total of prices. Where the tenderer elects to confirm the tender offer as tendered, correct the errors as follows: - If bills of quantities or pricing schedules apply and there is an error in the line-item total resulting from the product of the unit rate and the quantity, the line-item total shall govern, and the rate shall be corrected. Where there is an obviously gross misplacement of the decimal point in the unit rate, the line-item total as quoted shall govern, and the unit rate shall be corrected. - Where there is an error in the total of the prices either as a result of other corrections required by this checking process or in the tenderer's addition of prices, the total of the prices shall govern, and the tenderer will be requested to revise selected item prices (and their rates if bills of quantities apply) to achieve the tendered total of the prices. Clarification session(s) shall be held with Tenderer where there is pricing discrepancies, errors are highlighted and identified corrections are explained. Tenderer is afforded an opportunity to provide clarification, accept or reject identified corrections in writing. - In the event that the Tenderer accepts identified corrections, JW will proceed with evaluation. - In the event that the Tenderer rejects the identified correction(s), JW must review the Tenderer's motivation and risks associated with the proposed change. This is not an opportunity for Tenderers to change the bid offer. A bidder that does not agree to the above will be disqualified. Risk related to the Arithmetic Corrections shall be assessed. Where risks are identified, tenderers shall provide JW with any other material or information that has a bearing on the tender offer, the tenderer's commercial position (including joint venture agreements), quotations preferencing arrangements or samples of materials considered necessary by JW for the purpose of a full and fair risk assessment.

Employer:		Contractor:	
Witness:		Witness:	



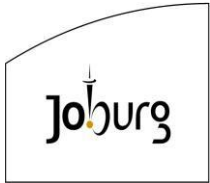
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Clause number	Tender Data												
	Should the tenderer not provide the material, or a satisfactory reason as to why it cannot be provided, by the time for submission stated in the JW request or fails to attend any meeting in which it has been formally invited to clarify any issue, the tender offer will be regarded as non-responsive												
C.3.11	Tenderer to complete, sign and return MBD6.1 with the tender submission. Tenderer to claim the points in the space provided and submit documentary evidence to support the points claimed for specific goals. <table border="1"> <tr> <th colspan="2"></th></tr> <tr> <td>Stage 1</td><td>Mandatory Evaluation</td></tr> <tr> <td>Stage 2</td><td>Administrative Evaluation</td></tr> <tr> <td>Stage 3</td><td>Technical Evaluation</td></tr> <tr> <td>Followed by.....</td><td>Preferential Procurement Goals and Pricing Evaluation</td></tr> <tr> <td></td><td></td></tr> </table>			Stage 1	Mandatory Evaluation	Stage 2	Administrative Evaluation	Stage 3	Technical Evaluation	Followed by.....	Preferential Procurement Goals and Pricing Evaluation		
Stage 1	Mandatory Evaluation												
Stage 2	Administrative Evaluation												
Stage 3	Technical Evaluation												
Followed by.....	Preferential Procurement Goals and Pricing Evaluation												

Employer:		Contractor:	
Witness:		Witness:	



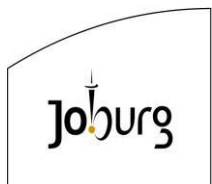
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Section T1 Tendering Procedures

Clause number	Tender Data			
C.1.1	<u>Mandatory Requirements</u>			
	1	CIBD grading 9ME		
	2	Mandatory Tender Briefing Meeting		
	3	Completed and signed Form of Offer		
	4	Acknowledgement of Project Tender Drawings		
	5	Acknowledgement of SHE Specification & Annexures		
	6	Acknowledgement of Project Specification		
Tenderers who FAIL to meet the mandatory criteria or requirements of tender will result in disqualification.				

Employer:		Contractor:	
Witness:		Witness:	



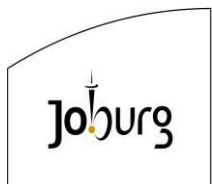
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Clause number	Tender Data				
	<u>Administrative Requirements</u>				
	Description			Complied	
	Reference	Description	Requirement	Yes	No
	T2.1.1	Record of Addenda to Tender Documents	Complete and submit complete and signed Form		
	T2.1.2	Signed Certificate of Authority to Sign or signed board resolution	Completed and signed certificate of authority to sign or signed board resolution		
	T2.2.2	SARS Tax Compliance Status Pin and Proof of CSD registration	Complete and submit complete and signed Form plus attachment		
	T2.3.4	Imported Content Sheet: Forward Exchange Cover for Imported	Complete and submit complete and signed Form		
	MBD 1	Invitation to Bid Form	Complete and submit complete and signed MBD 1 Form.		
	CSD	Central Supplier Database Registration	Provide proof of CSD registration.		
	MBD 4	Declaration of Interest	Complete and submit complete and signed MBD 4 Form.		

Employer:		Contractor:	
Witness:		Witness:	



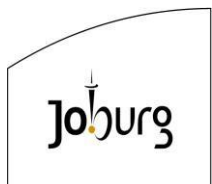
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Clause number	Tender Data				
	MBD 5	Declaration of Procurement Above R10m (All Applicable Taxes Included)	Complete and submit signed MBD 5 Form.		
	T2.3.2	Acknowledgement of Project Tender Drawings	Complete and submit signed T2.3.2 Form.		
	T2.3.1	Acknowledgement of SHE Specification & Annexures	Complete and submit signed T2.3.1 Form.		
	MBD 6.1	Preference Points Claim in Terms of The Preferential Procurement Regulations 2022	Complete and submit complete and signed MBD 6.1 Form.		
	MBD 8	Declaration of Bidder's Past Supply Chain Management Practices	Complete and submit complete and signed MBD 8 Form.		
	MBD 9.	Certificate of Independent Bid Determination	Complete and submit complete and signed MBD 9 Form.		
	Annexure – Proof of Specific Goals	Municipal statement of the company (not older than three (03) months from the closing date of tender or a valid lease agreement at time of tender closure).	Submit applicable documentation with the tender submission		
	Annexure – Proof of Specific Goals	Valid Construction Sector BBBEE Certificate issued by SANAS accredited verification agency or DTI/CIPC BBBEE Certificate for Exempted Micro Enterprises or Affidavit sworn under oath, OR CIPC	Submit applicable documentation with the tender submission		

Employer:		Contractor:	
Witness:		Witness:	



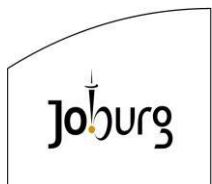
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Clause number	Tender Data				
		registration document showing percentage of ownership and share certificate where applicable			
	Annexure	Municipal statement of account for Director/s (not older than three (03) months from the closing date of tender or a valid lease agreement at time of tender closure).	Submit applicable documentation with the tender submission		
	Annexure	Municipal statement of account for Company (not older than three (03) months from the closing date of tender or a valid lease agreement at time of tender closure).	Submit applicable documentation with the tender submission		
	Annexure	3-year financial statements (audited where applicable)	Submit applicable documentation with the tender submission		
	Annexure	Joint Venture Consortium or equivalent Agreement signed by all parties.	Submit applicable documentation with the tender submission		
Tenderers will be notified of any omitted, outstanding, missing and or incomplete administrative documents and will be offered a period of 3 days to complete or submit those pages i.e., Municipal Bidding Documents (MBD), authority to sign and other administrative documents that require completion and signatures. These exclude documentation on functionality, price and preference points for specific goals. Tenders that are received contrary to the above requirements will be disqualified after three (3) days period has lapsed. Any document or form submitted or completed upon request (was not included in the initial tender submission before the closing date) will not be used to claim points for specific goals.					

Employer:		Contractor:	
Witness:		Witness:	



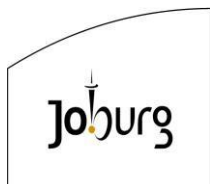
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Clause number	Tender Data						
1	Technical Evaluation						
	Tenderers who FAIL to meet the minimum required score or requirements of tender will be disqualified. The criteria maximum points in respect of each of criterion shall be as follows:						
	NO #	CRITERIA	EVIDENCE	SUB-CRITERIA/CLAUSE		MAX SCORE	Minimum Score
	1	Tenderers experience with respect to specific aspects of the project / comparable projects	Supporting Documents Required include Reference Letters as per T2.1.6 and T2.1.7 (Or on Client Letter Head with all required Information) and Completion / Approval Certificates per project completed. <i>Note: This reference letter must be completed by the referee/previous client of the tenderer and included in the tender submission. Alternatively, the Clients letterhead may be used provided it complies with the functional requirements. A separate form must be completed for each reference as a requirement in the evaluation criteria. The information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting in participating in any future government tenders. The letter must show evidence of experience on Mechanical wastewater or potable water treatment projects with a minimum value of R80mil each. JW will conduct site visit to verify the reference provided.</i>	Experience on Mechanical wastewater or potable water treatment projects with a value of R 80 mil	Tenderer Has Completed 0-1 Project	25	20
					Tenderer Has Completed at Least 2 Projects		
					Tenderer has completed 3 or more Projects.		
							0
							20
							25

Employer:		Contractor:	
Witness:		Witness:	



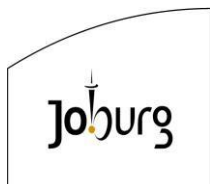
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Clause number	Tender Data						
	NO #	CRITERIA	EVIDENCE	SUB-CRITERIA/CLAUSE		MAX SCORE	Minimum Score
	2	Tenderers experience with respect to specific aspects of the project / comparable projects	Supporting Documents Required include Reference Letters as per T2.1.6 and T2.1.7 (Or on Client Letter Head with all required Information) and Completion / Approval Certificates per project completed. Note: <i>This reference letter must be completed by the referee/previous client of the tenderer and included in the tender submission. Alternatively, the Clients letterhead may be used provided it complies with the functional requirements. A separate form must be completed for each reference as a requirement in the evaluation criteria. The information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting in participating in any future government tenders. The letter must show evidence of experience on Electrical wastewater or potable water treatment projects minimum value of R80m. JW will conduct site visit to verify the reference provided.</i>	Experience on Electrical Project wastewater or potable water treatment with a minimum value of R 80 mil.	Tenderer has Completed 0 Project	15	10
					Tenderer has Completed at Least 1 Projects		
					Tenderer has completed 2 or more Projects.		

Employer:		Contractor:	
Witness:		Witness:	



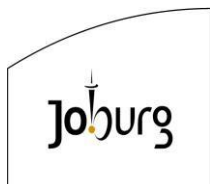
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Clause number	Tender Data						
	CRITERIA NO	CRITERIA	EVIDENCE	SUB-CRITERIA/CLAUSE		MAX SCORE	SCORE
	3	Post Qualification Experience of Contract Manager Only Contract Managers with minimum Qualifications of: - Bachelor's degree (Civil, or Mechanical or Electrical Engineering) OR - Quantity Surveying/ Construction Management) equivalent or higher. AND - Valid Professional Registration (Pr. Eng. / Pr. Tech.Eng) OR PrCPM / PrCM/ PrQS will obtain a score for experience of a Contract Manager. However, the time of registration of Contract Manager will not impact post qualification number of projects	Tenderer must provide CV of Contract Manager in the format given in T2.1.9 Note: Tenderers may submit their own CV formats; however, the submitted CVs must include all the information required for functionality evaluation. Note: Certified Copies of qualifications and valid registrations are to accompany the CVs. Note: The information provided will be verified by requesting certified copies from successful bidder and if found to be false punitive measures will be effected.	Number of completed Mechanical, Electrical or Civil wastewater or potable water treatment projects with a value of R 80 mil.	0 Completed Projects	15	0
					2 Completed Projects		10
					3 completed or more Projects.		15

Employer:		Contractor:	
Witness:		Witness:	



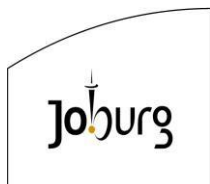
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Clause number	Tender Data						
	NO #	CRITERIA	EVIDENCE	SUB-CRITERIA/CLAUSE		MAX SCORE	SCORE
	4	Post Qualification Experience of Site Agent Only Site Agents with minimum qualifications of: National Diploma (Mech/Elec) Engineering or higher qualification in Mechanical or Electrical.	Tender must Provide CV of Site Agent in the format given on T2.1.9 Note: Tenderers may submit their own CV formats; however, the submitted CVs must include all the information required for functionality evaluation. Note: Certified Copies of qualifications and valid registrations are to accompany the CVs. Note: The information provided will be verified by requesting certified copies from successful bidder and if found to be false punitive measures will be effected.	Number of completed Mechanical or Electrical wastewater or potable water treatment projects with a value of R 80 mil.	0 -1 Completed Projects 2 Completed Projects 3 completed or more Projects.	15	0 10 15

Employer:		Contractor:	
Witness:		Witness:	



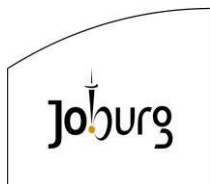
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Clause number	Tender Data						
	NO #	CRITERIA	EVIDENCE	SUB-CRITERIA/CLAUSE		MAX SCORE	SCORE
	5	Post Qualification Experience of Safety Officer Only Safety Officers with minimum qualifications of: National Diploma (Safety Management)/National Diploma (Environmental Health/Environmental Science/ Environmental Management) /SAMTRAC / SHEOMTRAC/ SHEMTRAC / MESHTRAC /NEBOSH / Safety Officers Course (NQF 5) or more, AND Valid Professional Registered with SACPCMP in the Construction Health and Safety Sector will be considered	Tender must Provide CV of Safety Officer in the format given on T2.1.9 Note: All Civil Engineering related projects will be considered. Note: Copies of qualifications and valid registrations are to accompany the CVs. Note: The information provided will be verified by requesting certified copies from successful bidder and if found to be false punitive measures will be effected.	Number of completed Mechanical, Electrical or Civil Projects Completed as Safety Officer	0 - 1 Completed Projects	10	0
					2 - 4 Completed Projects		7
					More than 4 Completed Projects		10

Employer:		Contractor:	
Witness:		Witness:	



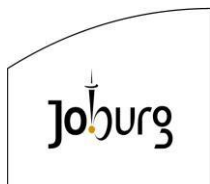
Contract: JW13897
Northern Wastewater Treatment Works
Expansion of Capacity Unit 5 – Installation of
Mechanical and Electrical Equipment



Volume 1 Tender and Contract
Section T1 Tendering Procedures

Clause number	Tender Data					
	CRITERIA NO #	CRITERIA	EVIDENCE	SUB-CRITERIA/CLAUSE	MAX SCORE	SCORE
	6	Site Specific Method Statement	Tenderer must provide Site Specific Method Statement Which Addresses the following sections: • Quality Control Plan (Minimum1 Page -Maximum 4 pages) including all necessary standards to be used, resources available and procedures to ensure quality. This is inclusive of the following major components, - procurement, manufacturing, installation & commissioning; - Quality Control Plans examples; - Company Policies and ISO registration. • Project Programme/Schedule (On MS Projects or any other Gantt chart as Annexure) outlining critical path, aligned to the scope of works, aligned to the contractual timelines, and including all contractual dates. This is inclusive of the following major components, - Aerators, mixers, pumps, settling tanks bridges, screens. - Motor Control Panels and PLC's, designs and approvals, manufacturing, testing, installation, commissioning - procurement, manufacturing, installation of mechanical and electrical equipment - testing and commissioning of complete equipment - 24 month period.	Method Statement not submitted	20	0
				At least one of the required sections are covered by the Method Statement in line with the guidelines and are specific to Waste Water Treatment		18
				All two of the required sections are covered by the Method Statement in line with the guidelines and are specific to Waste Water Treatment		20
					MINIMUM QUALIFYING SCORE	

Employer:		Contractor:	
Witness:		Witness:	



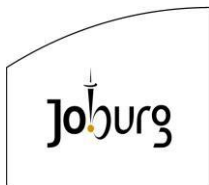
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Volume 1 Tender and Contract
Section T1 Tendering Procedures

Clause number	Tender Data		
		TOTAL	100
	TENDERER NEEDS TO SCORE A MINIMUM POINT FOR CRITERIA 1 AND 2 PLUS A MINIMUM OVERALL SCORE OF 75 TO PROCEED NEXT STAGE OF EVALUATION. NOTE 1: Where applicable, foreign qualifications MUST be accompanied by a SAQA verification certificate. Failure to submit SAQA verification certificate will lead to that qualification not being considered for allocation of points for that criterion. NOTE 2: When an uncertified copy of professional registration is submitted and the requirement was to submit a certified copy, JW will verify the validity of the registration on the issuing bodies or institution's website. If the verification is confirmed on the website, the bidder meets the criteria. This will only be applicable for the recommended bidders. NOTE 3: The time of registration of Contract Manager, Site Agent and Safety Officer will not impact post qualification number of projects. NOTE 4: The information provided by bidders will be verified and if found to be false, punitive measures will be affected. ECSA: Engineering Council of South Africa SACPCMP: South African Council for the Project and Construction Management Professions SAMTRAC: Safety Management Training Course NEBOSH: National Examination Board in Occupational Safety and Health SHEOMTRAC: Safety Health Environmental Occupational Management Training Course SHEMTRAC: Safety Health Environmental Management Training Course MESHTRAC: Management Environmental Safety Health Training Course		

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW13897

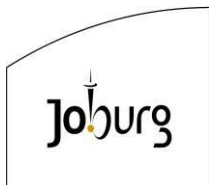
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Volume 1 Tender and Contract
Section T1 Tendering Procedures

Clause Number	Tender Data				
C.3.11.2 & C.3.11.3	The procedure for the evaluation of responsive tenders is Method 2 (Financial Offer and Specific Goals): 1. APPLICATION OF THE PREFERENCE POINTS SCORING SYSTEM <u>The following preference point systems are applicable to all bids:</u> - the 90/10 system for requirements with a Rand value above R50 000 000 (all applicable taxes included). - The Specific Goals for the tender will be stated in MBD 6.1. In MBD 6.1, the tenderer must indicate how many points they are claiming for each Specific Goal and must submit all the required supporting documentation for the points to be verified and awarded by JW. JW will evaluate the submitted supporting documentation and confirm Specific Goal points claimed by the tenderer. Specific goals to be allocated by the Bid Evaluation Committee will depend on verification documentation submitted. - Only tenderers that have completed and signed MBD 6.1 and submitted applicable verification documents will be allocated Specific Goal points for preferencing. a. The value of this bid is estimated to exceed R50 000 000 (all applicable taxes included) and therefore the 90/10 preference point system shall be applicable. b. Preference points for this bid shall be awarded for: Price; and Specific Goals. c. The maximum points for this bid are allocated as follows: <table border="1"> <tr> <td>Price</td><td>90</td></tr> <tr> <td>Specific goals</td><td>10</td></tr> </table> d. Failure on the part of a bidder to submit proof of specific goals points claimed in MBD 6.1 will not result in disqualification but will result in points not being awarded for Specific Goals.	Price	90	Specific goals	10
Price	90				
Specific goals	10				

Employer:		Contractor:	
Witness:		Witness:	



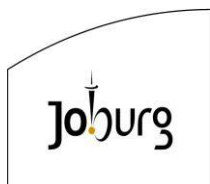
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Volume 1 Tender and Contract
Section T1 Tendering Procedures

Clause Number	Tender Data
	SPECIFIC GOALS In terms of Regulation 4(2); 5(2); 6(2) and 7(2) of the Preferential Procurement Regulations 2022, preference points must be awarded for specific goals stated in the tender. For the purposes of this tender the tenderer will be allocated points based on the goals stated in table 1 below as may be supported by proof/ documentation stated in the conditions of this tender. Specific goals may include contracting with persons, or categories of persons, historically disadvantaged by unfair discrimination on the basis of race, gender or disability. Race: I. Ownership by black people II. Black Designated Group: - Ownership by black people that are unemployed - Ownership by black people who are youth - Ownership by black people living in rural or underdeveloped areas or townships - Ownership by black people with disabilities - Ownership by black people who are military veterans - Cooperative owned by black people Gender: III. Persons, or categories of persons, historically disadvantaged by unfair discrimination on the basis of gender are women. Ownership by persons that are classified as female or women according to the Department of Home Affairs of South African. Disability: IV. Persons, or categories of persons, historically disadvantaged by unfair discrimination on the basis of disability are disabled persons. Reconstruction and Development Programme (RDP) objectives as published in Government Gazette No. 16085 dated 23 November 1994 i.e., Local Manufacture:

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW13897

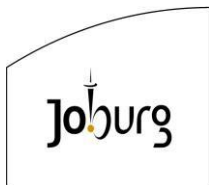
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Volume 1 Tender and Contract
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Clause Number	Tender Data
	I. Promotion of procurement of locally manufactured goods in South Africa to promote job creation in light of the high unemployment rate in South Africa which has a greater impact previously disadvantaged individuals and black youth. Locality: I. Promotion of procurement from local business in the geographical areas that JW operate in. This is also directed at creating employment in the areas JW operate in. The BSC may allocate points as follows: • Promotion of enterprises located in the Gauteng Province • Promotion of enterprises located in a specific region within COJ (the 7 regions. A to G) • Promotion of enterprises located in the City of Johannesburg municipality • Promotion of enterprises located rural or underdeveloped areas or townships. Qualifying Small Enterprises (QSE) I. Promotion of procurement from QSE's that are black owned. Exempted Micro Enterprises (EME): I. Promotion of procurement from EME's that are black own. SUB-CONTRACTING: Promotion of a company previously owned by a Historically Disadvantaged Individuals (HDI). Consider sub-contract only in cases where there are no company which can meet any of the specific goals. Check if the portion of the work cannot be subcontracted in terms of specific goals. One goal may be chosen, or a combination of goals may be decided upon including a sub-goal i.e., owned by black people that are disabled etc., JOINT VENTURE, CONSORTIUM OR EQUIVALENT: For Joint Venture Agreements, Consortiums or equivalent, the agreement must show percentages of ownership and work to be completed by each party. This agreement must form part of the tender submission. To determine the Joint Venture, Consortium or equivalent score for specific goals, JW will look at the consolidated BBBEE certificate to determine the points for specific goals that will be awarded to the tenderer. If a consolidated BBBEE certificate is not submitted, the parties to the joint venture, consortium or equivalent must submit their individual BBBEE certificates issued by a SANAS

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW13897

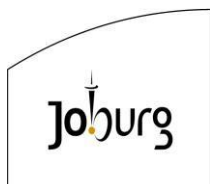
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Volume 1 Tender and Contract
Section T1 Tendering Procedures

Clause Number	Tender Data														
	accredited verification agency or the documents listed below on 4.6 and the joint venture, consortium or equivalent agreement in order for JW to determine the proportional points for specific goals. Documentation to be provided: - JV, Consortium, or equivalent agreement - Consolidated BBBEE certificate issued by an SANAS accredited verification agency. Certificate must be valid Table 1: <table> <tr> <td colspan="2"></td></tr> <tr> <td>Businesses located within the boundaries of Gauteng</td><td>5</td></tr> <tr> <td>Business owned by 51% or more-Women</td><td>5</td></tr> <tr> <td>Total</td><td>10</td></tr> </table> The following verification documents must be submitted with the tender document: <table> <tr> <td colspan="2"></td></tr> <tr> <td>Businesses located within the boundaries of Gauteng</td><td>Municipal Account or Lease agreement.</td></tr> <tr> <td>Business owned by 51% or more-Women-</td><td> Valid BBBEE Certificate issued by SANAS accredited verification agency or DTI/CIPC BBBEE Certificate for Exempted Micro Enterprises or Affidavit sworn under oath, OR - CIPC registration document showing percentage of ownership and share certificate where applicable </td></tr> </table> Note: The joint venture, consortium, or equivalent agreement in order for JW to determine the proportional points for specific goals			Businesses located within the boundaries of Gauteng	5	Business owned by 51% or more-Women	5	Total	10			Businesses located within the boundaries of Gauteng	Municipal Account or Lease agreement.	Business owned by 51% or more-Women-	Valid BBBEE Certificate issued by SANAS accredited verification agency or DTI/CIPC BBBEE Certificate for Exempted Micro Enterprises or Affidavit sworn under oath, OR CIPC registration document showing percentage of ownership and share certificate where applicable
Businesses located within the boundaries of Gauteng	5														
Business owned by 51% or more-Women	5														
Total	10														
Businesses located within the boundaries of Gauteng	Municipal Account or Lease agreement.														
Business owned by 51% or more-Women-	Valid BBBEE Certificate issued by SANAS accredited verification agency or DTI/CIPC BBBEE Certificate for Exempted Micro Enterprises or Affidavit sworn under oath, OR CIPC registration document showing percentage of ownership and share certificate where applicable														

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW13897

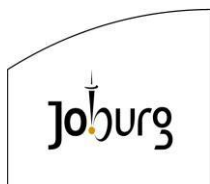
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Clause Number	Tender Data		
	Example, If there are two parties in a Joint Venture with a 50:50 ownership of the Joint Venture and one party is located within the boundaries of COJ and one is located in Tshwane, if one of the goals is locality and has total points of 4, the JV will only be entitled the proportional points of 2.		
	The following are the requirements for the Sworn Affidavit it terms of the BBBEE Sector Codes of Good Practise:		
	Affidavit Prescribed Formats	Category	Financial Threshold
	Generic Enterprises		
		BO QSE	Between R10m and R50m
		BO EME	Less than R10m
	Sector Specific Enterprises		
		BO QSE	Between R10m and R50m
		BO EME	Less than R10m
	Construction Sector Code		
		EME Contractor	Less than R3m
		BO EME BEP	Less than R1.8m
	Financial Sector Code		
		BO QSE	Between R10m and R50m
		BO EME	Less than R10m
	Information Communication Technology Sector Code (ICT)		
		BO QSE	Between R10m and R50m
		BO EME	Less than R10m
	Marketing, Advertising & Communication Sector Code (MAC)		
	> Public Relations	BO QSE	Between R5m and R10m
	> Marketing, Advertising & Communications	BO EME	Less than R5m
	Property Sector Code		
> Service-based	BO QSE	Between R5m and R10m	
	EME	Less than R5m	
> Agency-based	BO QSE	Between R2.5m and R35m	

Employer:		Contractor:	
Witness:		Witness:	



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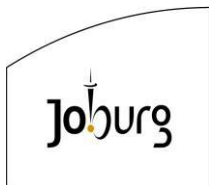
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Volume 1 Tender and Contract
Section T1 Tendering Procedures

Clause Number	Tender Data		
	> Asset-based	EME	Less than R2.5m
		BO QSE	Between R80m and R400m
	Tourism Sector Code		
		BO QSE	Between R5m and R45m
		BO EME	Less than R5m
	Specialised Enterprises		
		BO QSE	Between R10m and R50m
		BO EME	Less than R10m
	Note: A sworn affidavit received from a tenderer that does not meet the above requirement will not be considered for the allocation of points for specific goals. Requirements for a valid BBBEE Certificate a) Copy of a certified valid BBBEE certificate (Only Valid BBBEE certificate must be accredited by SANAS) or valid Sworn Affidavit issued by the DTIC or the CIPC or in a similar format complying with commissioner of oath Act. b) Bidders who do NOT qualify as EME's and QSE's as outlined in 4.5, must submit B-BBEE verification certificates that are issued by an Agency accredited by SANAS. c) Bidders who fail to submit a certified copy of their valid B-BBEE certificate or valid sworn affidavit or valid DTI / CIPC B-BBEE certificate will score zero points for specific goals. Valid Sworn Affidavits or certified copies of B-BBEE Certificate must comply with the requirements outlined in the Justices of the Peace and Commissioners of Oaths Act, no 16 of 1963 and its Regulations promulgated in Government Notice GNR 1258 of 21 July 1972 Justices of the Peace and Commissioners of Oaths Act, No. 16 of 1963. i.e. (i) The deponent shall sign the declaration in the presence of the commissioner of oaths (COA). (ii) Below the deponent's signature the COA shall certify that the deponent has acknowledged that he knows and understands the contents of the declaration and the COA shall state the manner, place, and date of taking the declaration. (iii) The COA shall sign the declaration and print his full name and business address below his signature; and state his designation and the area for which he holds his appointment, or the office held by him if he holds his appointment ex officio. (iv) Copy of certified copies will not be accepted. Note: A tenderer failing to submit proof of specific goals claimed as per 4.4 will not be disqualified but will be allocated zero points for specific goals and will be allocated points for pricing.		

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW13897

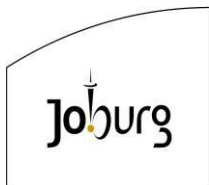
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Volume 1 Tender and Contract
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Clause Number	Tender Data
	ADJUDICATION USING A POINT SYSTEM (a) The bidder obtaining the highest number of total points will be awarded the contract. (b) Preference points shall be calculated after prices have been brought to a comparative basis taking into account all factors of non-firm prices and all unconditional discounts. (c) Points scored must be rounded off to the nearest 2 decimal places. (d) In the event that two or more bids have scored equal total points, the successful bid must be the one scoring the highest number of points for specific goals. (e) However, when functionality is part of the evaluation process and two or more bids have scored equal points including equal preference points for specific goals, the successful bid must be the one scoring the highest score for functionality. (f) Should two or more bids be equal in all respects, the award shall be decided by the drawing of lots. POINTS AWARDED FOR PRICE THE 80/20 OR 90/10 PREFERENCE POINT SYSTEMS A maximum of 90 points is allocated for price on the following basis: 90/10 $P_s = 90 \left(1 - \frac{P_t - P_{\min}}{P_{\min}} \right)$ Where: P_s = Points scored for comparative price of bid under consideration P_t = Comparative price of bid under consideration P_{min} = Comparative price of lowest acceptable bid
C.3.12	Add the following to the clause: “Accept that the submission of a Tender shall be construed as an acknowledgement by the Tenderer that they are satisfied with the insurance cover, the Employer will affect under the contract.”
	Add to the existing clause: Tender offers will only be accepted if: a) the tenderer submits a valid SARS tax Compliance status Pin for tenders issued by the South African Revenue Services or has made arrangements to meet outstanding tax obligations. b) Proof of CSD registration i.e., MA xxxxx number. c) the tenderer submits a letter of intent from an approved insurer undertaking to provide the Performance Guarantee to the format included in Part T2.2.22 of this procurement document. d) the tenderer is registered with the Construction Industry Development Board in an appropriate contractor grading designation.

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW13897

Northern Wastewater Treatment Works
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Mechanical and Electrical Equipment



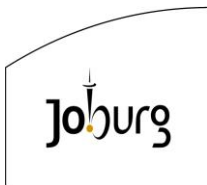
Volume 1 Tender and Contract
Section T1 Tendering Procedures

Clause Number	Tender Data
	e) the tenderer or any of its directors/shareholders is not listed on the Register of Tender Defaulters in terms of the Prevention and Combating of Corrupt Activities Act of 2004 as a person prohibited from doing business with the public sector. f) the tenderer has not: i) abused the Employer's Supply Chain Management System; or ii) failed to perform on any previous contract and has been given a written notice to this effect. g) the tenderer has completed the Compulsory Enterprise Questionnaire and there are no conflicts of interest which may impact on the tenderer's ability to perform the contract in the best interests of the Employer or potentially compromise the tender process and persons in the employ of the state are permitted to submit tenders or participate in the contract. h) the tenderer is registered and in good standing with the compensation fund or with a licensed compensation insurer. i) the Employer is reasonably satisfied that the tenderer has in terms of the Construction Regulations, 2014, issued in terms of the Occupational Health and Safety Act, 1993, the necessary competencies and resources to carry out the work safely; and j) the tenderer: i) has sufficiently substantiated his experience in this type of work. ii) has the required and experienced key personnel; and iii) Owns the primary equipment to execute the work effectively and efficiently.
C.3.17	The number of paper copies of the signed contract to be provided by the Employer is one.
	There are no additional Conditions of Tender.

--- END OF PART ---

/

Employer:		Contractor:	
Witness:		Witness:	



Johannesburg Water (SOC) Ltd



CONTRACT NO. JW13897

NORTHERN WASTEWATER TREATMENT WORKS

**EXPANSION OF CAPACITY UNIT 5 – INSTALLA-
TION OF MECHANICAL AND ELECTRICAL
EQUIPMENT**

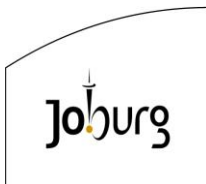
VOLUME 1

**RETURNABLE DOCUMENTS
AND
SCHEDULES**



CIDB Advert.msg

Employer:		Contractor:	
Witness:		Witness:	



Volume 1 Tender and Contract
Section T2 Returnable Documents

T2.1 LIST OF RETURNABLE DOCUMENTS

The tenderer must complete the following returnable documents:

<u>Document</u>	<u>Page</u>
1. Returnable Schedules required for tender evaluation purposes	
T2.1.1 Record of addenda to tender documents	RD. 4
T2.1.2 Certificate of Authority	RD. 5
T2.1.3 Compulsory Enterprise Questionnaire	RD. 9
T2.1.4 Preferential Procurement	RD 11
MBD 6.1 Preference points claim form in terms of the preferential procurement regulations	RD.12
MBD 4 Declaration of any potential conflict of interest	RD.18
MBD 8 Declaration of bidder's past Supply Chain management practices	RD.20
MBD 5 Declaration for Procurement above R10 Million (VAT Included)	RD.22
MBD 9 Certificate of independent bid determination	RD.24
T2.1.5 Proposed qualifications	RD.27
T2.1.6 Schedule of the Tenderer's experience	RD.28
T2.1.7 Contactable reference template	RD.29
T2.1.8 Schedule of key personnel	RD.42
T2.1.9 Curriculum vitae of key personnel	RD.43
T2.1.10 Site Specific Method Statement	RD.44

T2.2 LIST OF RETURNABLE DOCUMENTS

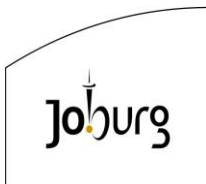
<u>Document</u>	<u>Page</u>
2. Documents required only for tender evaluation purposes	
T2.2.1 Certificate of Contractor Registration issued by the Construction Industry Development Board	RD.53
T2.2.2 SARS Tax Compliance Status Pin and Proof of CSD registration i.e. MA xxxxxxxxxxxx number	RD.54

T2.3 LIST OF OTHER RETURNABLE DOCUMENTS

<u>Document</u>	<u>Page</u>
3. Other documents that will be incorporated into the Contract	
T2.3.1 JW 6.4 Returnable Annexure A – SHE Acknowledgment Form	RD.55
T2.3.2 JW 6.5 Returnable Annexure B: Acknowledgement of Tender Drawings	RD.56
T2.3.3 JW 6.5 Returnable Annexure C: Acknowledgement of JW Technical Specifications	RD 59
T2.3.4 Returnable Annexure D: Technical Data Sheets	RD 60

NOTE: The Tenderer is required to complete each and every schedule listed above to the best of his ability as the evaluation of tenders and the eventual contract will be based on the information provided by the tenderer.

Employer:		Contractor:	
Witness:		Witness:	



Contract JW13897
Northern Wastewater Treatment Works
Expansion of Capacity Unit 5 – Installation of
Mechanical and Electrical Equipment



Volume 1 Tender and Contract
Section T2 Returnable Documents

T2.1.1 Record of Addenda to Tender Documents

We confirm that the following communications received from the Employer before the submission of this tender offer, amending the tender documents, have been taken into account in this tender offer:

	Date	Title or Details
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		

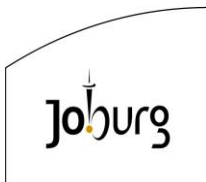
Attach additional pages if more space is required.

Signed _____ Date _____

Name _____ Position _____

Tenderer _____

Employer:		Contractor:	
Witness:		Witness:	



Contract JW13897
Northern Wastewater Treatment Works
Expansion of Capacity Unit 5 – Installation of
Mechanical and Electrical Equipment



Volume 1 Tender and Contract
Section T2 Returnable Documents

T2.1.2 Certificate of Authority

Indicate the status of the Tenderer by ticking the appropriate box hereunder. The Tenderer must complete the certificate set out below for the relevant category.

(I) COMPANY	(II) CLOSE CORPO- RATION	(III) PARTNERSHIP	(IV) JOINT VENTURE	(V) SOLE PROPRIE- TOR

i. Certificate For Company

I, ..., chairperson of the Board of Directors of, hereby confirm that by resolution of the Board (copy attached) taken on, Mr/Ms, acting in the capacity of, was authorized to sign all documents in connection with the tender for Contract No. JW13897 and any contract resulting from it on behalf of the company.

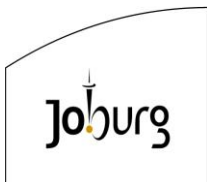
Chairman:

As Witnesses: 1.....

2.....

Date:

Employer:		Contractor:	
Witness:		Witness:	



Contract JW13897
Northern Wastewater Treatment Works
Expansion of Capacity Unit 5 – Installation of
Mechanical and Electrical Equipment



Volume 1 Tender and Contract
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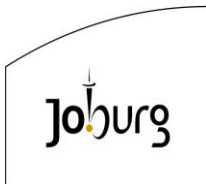
ii. **Certificate For Close Corporation**

We, the undersigned, being the key members in the business trading as
..... hereby authorize Mr/Ms , acting in the capacity of
....., to sign all documents in connection with the
tender and any contract resulting from it on our behalf.

NAME	ADDRESS	SIGNATURE	DATE

Note : This certificate is to be completed and signed by all of the key members upon whom rests the direction of the affairs of the Close Corporation as a whole.

Employer:		Contractor:	
Witness:		Witness:	



Contract JW13897
Northern Wastewater Treatment Works
Expansion of Capacity Unit 5 – Installation of
Mechanical and Electrical Equipment



Volume 1 Tender and Contract
Section T2 Returnable Documents

iii. Certificate For Partnership

We, the undersigned, being the key partners in the business trading as,

....., hereby authorize Mr/Ms,

acting in the capacity of

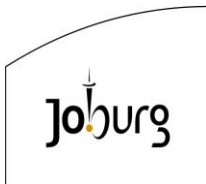
, to sign all documents in connection

with the tender and any contract resulting from it on our behalf.

NAME	ADDRESS	SIGNATURE	DATE

Note: This certificate is to be completed and signed by all of the key partners upon whom rests the direction of the affairs of the Partnership as a whole.

Employer:		Contractor:	
Witness:		Witness:	



Contract JW13897
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Mechanical and Electrical Equipment



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iv. **Certificate For Joint Venture**

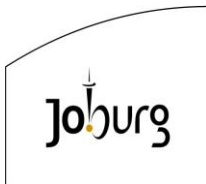
This Returnable Schedule is to be completed by joint ventures.

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

NAME OF FIRM	ADDRESS	DULY AUTHORISED SIGNATORY
Lead partner		Signature. Name Designation
		Signature. Name Designation
		Signature. Name Designation
		Signature. Name Designation

Note : This certificate is to be completed and signed by all of the key partners upon whom rests the direction of the affairs of the Joint Venture as a whole.

Employer:		Contractor:	
Witness:		Witness:	



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V. **Certificate For Sole Proprietor**

I, ..., hereby confirm that I am the sole owner of the Business.

trading as

Signature of Sole owner:

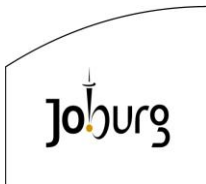
As Witnesses :

1.....

2.

Date :

Employer:		Contractor:	
Witness:		Witness:	



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T2.1.3 Compulsory Enterprise Questionnaire

The following particulars must be furnished. In the case of a joint venture, **separate** enterprise questionnaires in respect of each partner must be completed and submitted.

Section 1: Name of enterprise:

Section 2: VAT registration number, if any:

Section 3: CIDB registration number, if any:

Section 4: Particulars of sole proprietors and partners in partnerships

Name*	Identity number*	Personal income tax number*

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

Section 5: Particulars of companies and close corporations

Company registration number

.

Close corporation number

Proof of CSD registration i.e. MA xxxxxxxxx number.

.

SARS Tax Compliance status Pin number

Section 6: Record in the service of the state

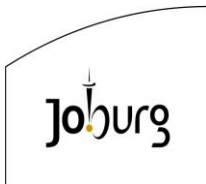
Indicate by marking the relevant boxes with a cross, if any sole proprietor, partner in a partnership or director, manager, principal shareholder or stakeholder in a company or close corporation is currently or has been within the last 12 months in the service of any of the following:

☐ a member of any municipal council	☐ an employee of any provincial department, national or provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act 1 of 1999)
☐ a member of any provincial legislature	☐ a member of an accounting authority of any national or provincial public entity
☐ a member of the National Assembly or the National Council of Province	☐ an employee of Parliament or a provincial legislature
☐ a member of the board of directors of any municipal entity	
☐ an official of any municipality or municipal entity	

If any of the above boxes are marked, disclose the following:

Name of sole proprietor, partner, director, manager, principal shareholder or stakeholder	Name of institution, public office, board or organ of state and position held	Status of service (tick appropriate column)	
		Current	Within last 12 months

*insert separate page if necessary



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Section 7: Record of spouses, children and parents in the service of the state

Indicate by marking the relevant boxes with a cross, if any spouse, child or parent of a sole proprietor, partner in a partnership or director, manager, principal shareholder or stakeholder in a company or close corporation is currently or has been within the last 12 months been in the service of any of the following:

☐ a member of any municipal council	☐ an employee of any provincial department, national or provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act 1 of 1999)
☐ a member of any provincial legislature	
☐ a member of the National Assembly or the National Council of Province	☐ a member of an accounting authority of any national or provincial public entity
☐ a member of the board of directors of any municipal entity	☐ an employee of Parliament or a provincial legislature
☐ an official of any municipality or municipal entity	

Name of spouse, child or parent	Name of institution, public office, board or organ of state and position held	Status of service (tick appropriate column)	
		Current	Within last 12 months

*insert separate page if necessary

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

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

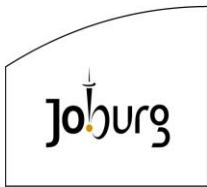
Signed

Date

Name

Position

Enterprise name



T2.1.4 Preferential Procurement

PREFERENCE POINTS CLAIM FORM IN TERMS OF THE PREFERENTIAL PROCUREMENT REGULATIONS 2022

This preference form must form part of all tenders invited. It contains general information and serves as a claim form for preference points for specific goals.

NB: BEFORE COMPLETING THIS FORM, TENDERERS MUST STUDY THE GENERAL CONDITIONS, DEFINITIONS AND DIRECTIVES APPLICABLE IN RESPECT OF THE TENDER AND PREFERENTIAL PROCUREMENT REGULATIONS, 2022

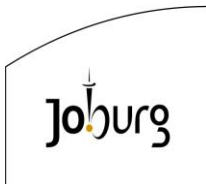
1. GENERAL CONDITIONS

- 1.1 The following preference point systems are applicable to invitations to tender:
- the 90/10 system for requirements with a Rand value above R50 000 000 (all applicable taxes included).
- 1.2 The applicable preference point system for this tender is the 90/10 preference point system.
- 1.3 Points for this tender (even in the case of a tender for income-generating contracts) shall be awarded for:
- a) Price; and
 - b) Specific Goals.

The maximum points for this tender are allocated as follows:

	POINTS
PRICE	90
SPECIFIC GOALS	10
Total points for Price and SPECIFIC GOALS	100

- 1.4 Failure on the part of a tenderer to submit proof or documentation required in terms of this tender to claim points for specific goals with the tender, will be interpreted to mean that preference points for specific goals are not claimed.
- 1.5 The organ of state reserves the right to require of a tenderer, either before a tender is adjudicated or at any time subsequently, to substantiate any claim in regard to preferences, in any manner required by the organ of state.



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2. DEFINITIONS

- a) **“tender”** means a written offer in the form determined by an organ of state in response to an invitation to provide goods or services through price quotations, competitive tendering process or any other method envisaged in legislation.
- b) **“price”** means an amount of money tendered for goods or services and includes all applicable taxes less all unconditional discounts.
- c) **“Rand value”** means the total estimated value of a contract in Rand, calculated at the time of bid invitation, and includes all applicable taxes;
- d) **“tender for income-generating contracts”** means a written offer in the form determined by an organ of state in response to an invitation for the origination of income-generating contracts through any method envisaged in legislation that will result in a legal agreement between the organ of state and a third party that produces revenue for the organ of state, and includes, but is not limited to, leasing and disposal of assets and concession contracts, excluding direct sales and disposal of assets through public auctions; and
- e) **“the Act”** means the Preferential Procurement Policy Framework Act, 2000 (Act No. 5 of 2000).

3. FORMULAE FOR PROCUREMENT OF GOODS AND SERVICES

3.1 POINTS AWARDED FOR PRICE

3.1.1 THE 90/10 PREFERENCE POINT SYSTEMS

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

90/10

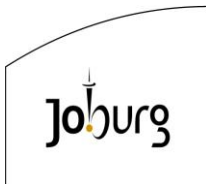
$$Ps = 90 \left(1 - \frac{Pt - P_{min}}{P_{min}} \right)$$

Where:

- Ps = Points scored for price of tender under consideration
- Pt = Price of tender under consideration
- Pmin = Price of lowest acceptable tender

4. POINTS AWARDED FOR SPECIFIC GOALS

- 4.1 In terms of Regulation 4(2); 5(2); 6(2) and 7(2) of the Preferential Procurement Regulations, preference points must be awarded for specific goals stated in the tender. For the purposes of this tender the tenderer will be allocated points based on the goals stated in Table 1 below as may be supported by proof/ documentation stated in the conditions of this tender:



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Table 1: Specific goals for the tender and points claimed are indicated per the table below.

Note to tenderers: The tenderer must indicate how they claim points for each preference point system.)

The specific goals allocated points in terms of this tender	Number of points allocated (90/10 system)	Number of points claimed (90/10 system) (To be completed by the tenderer)
Business owned by 51% or more-Women	5	
Business located within boundaries of Gauteng province	5	
Total	10	

5. DECLARATION WITH REGARD TO COMPANY/FIRM

5.1 Name of company/firm.....

5.2 Company registration number:

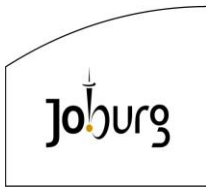
5.3 TYPE OF COMPANY/ FIRM

- ☐ Partnership/Joint Venture / Consortium
- ☐ One-person business/sole propriety
- ☐ Close corporation
- ☐ Public Company
- ☐ Personal Liability Company
- ☐ (Pty) Limited
- ☐ Non-Profit Company
- ☐ State Owned Company

[TICK APPLICABLE BOX]

5.4 I, the undersigned, who is duly authorised to do so on behalf of the company/firm, certify that the points claimed, based on the specific goals as advised in the tender, qualifies the company/ firm for the preference(s) shown and I acknowledge that:

- i) The information furnished is true and correct.
- ii) The preference points claimed are in accordance with the General Conditions as indicated in paragraph 1 of this form.
- iii) In the event of a contract being awarded as a result of points claimed as shown in paragraphs 1.4 and 4.2, the contractor may be required to furnish documentary proof to the satisfaction of the organ of state that the claims are correct.



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- iv) If the specific goals have been claimed or obtained on a fraudulent basis or any of the conditions of contract have not been fulfilled, the organ of state may, in addition to any other remedy it may have –
- (a) disqualify the person from the tendering process.
 - (b) recover costs, losses or damages it has incurred or suffered as a result of that person's conduct.
 - (c) cancel the contract and claim any damages which it has suffered as a result of having to make less favourable arrangements due to such cancellation.
 - (d) recommend that the tenderer or contractor, its shareholders, and directors, or only the shareholders and directors who acted on a fraudulent basis, be restricted from obtaining business from any organ of state for a period not exceeding 10 years, after the *audi alteram partem* (hear the other side) rule has been applied; and
 - (e) forward the matter for criminal prosecution, if deemed necessary.

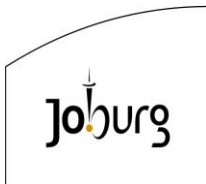
SIGNATURE(S) OF TENDERER

SURNAME AND NAME:

DATE:

ADDRESS:

.....
.....



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5.5 SUB-CONTRACTING

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

(Tick applicable box)

YES	☐	NO	☐

5.5.2 If yes, indicate:

- i) What percentage of the contract will be subcontracted _____ (minimum of 10%)
ii) The name of the sub-contractor(s):

.....
.....
.....
.....

- iii) The black shareholders of the sub-contractor(s):

.....
.....
.....
.....

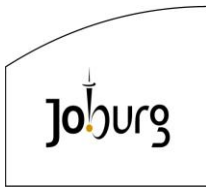
- iv) Whether the sub-contractor(s) is an EME or QSE

(Tick applicable box)

YES	☐	NO	☐

- v) Specify, by ticking the appropriate box, if subcontracting with an enterprise in terms of Preferential Procurement Regulations, 2022:

Designated Group: An EME or QSE which is at last 51% owned by:	EME √	QSE √
Black people		
Black people who are youth		
People who are women		
Black people with disabilities		
Black people living in rural or underdeveloped areas or townships		
Cooperative owned by black people		
Black people who are military veterans		
OR		
Any EME		
Any QSE		



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5.6 DECLARATION WITH REGARD TO COMPANY/FIRM

5.6.1 Name of company/firm:

5.6.2 VAT number registration number:

5.6.3 Company registration number:

5.7 TYPE OF COMPANY/ FIRM

- ☐ Partnership/Joint Venture / Consortium
 - ☐ One person business/sole propriety
 - ☐ Close corporation
 - ☐ Company
 - ☐ (Pty) Limited
- [TICK APPLICABLE BOX]'

5.8 DESCRIBE PRINCIPAL BUSINESS ACTIVITIES

.....
.....
.....
.....

5.9 COMPANY CLASSIFICATION

- ☐ Manufacturer
 - ☐ Supplier
 - ☐ Professional service provider
 - ☐ Other service providers, e.g. transporter, etc.
- [TICK APPLICABLE BOX]

5.10 MUNICIPAL INFORMATION

Municipality where business is situated:

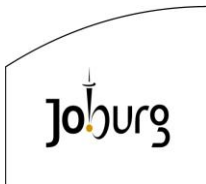
Registered Account Number:.....

Stand Number:

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

5.12 I/we, the undersigned, who is / are duly authorised to do so on behalf of the company/firm, certify that the points claimed, based on the Specific Goals in MBD 6.1 qualifies the company/ firm for the preference(s) shown and I / we acknowledge that:

- i) The information furnished is true and correct.
- ii) In the event of a contract being awarded as a result of points claimed as shown



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in MBD 6.1, the contractor is required to furnish documentary proof as requested in the Tender Data to the satisfaction of the purchaser that the claims are correct.

- iii) If the specific goals points have been claimed or obtained on a fraudulent basis or any of the conditions of contract have not been fulfilled, the purchaser may, in addition to any other remedy it may have –
- (a) Disqualify the person from the bidding process.
 - (b) Recover costs, losses or damages it has incurred or suffered as a result of that person's conduct.
 - (c) Cancel the contract and claim any damages which it has suffered as a result of having to make less favourable arrangements due to such cancellation.
 - (d) Recommend that the bidder or contractor, its shareholders and directors, or only the shareholders and directors who acted on a fraudulent basis, be restricted by the National Treasury from obtaining business from any organ of state for a period not exceeding 10 years, after the *audi alteram partem* (hear the other side) rule has been applied; and
 - (e) Forward the matter for criminal prosecution.

WITNESSES

1.
2.

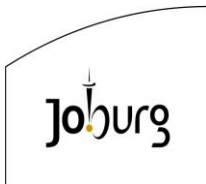
.....
SIGNATURE(S) OF BIDDERS(S)

DATE:

ADDRESS

.....

.....



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MBD 4

DECLARATION OF INTEREST

1. No bid will be accepted from persons in the service of the state¹.
2. Any person, having a kinship with persons in the service of the state, including a blood relationship, may make an offer or offers in terms of this invitation to bid. In view of possible allegations of favouritism, should the resulting bid, or part thereof, be awarded to persons connected with or related to persons in service of the state, it is required that the bidder or their authorised representative declare their position in relation to the evaluating/adjudicating authority.
3. **In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.**

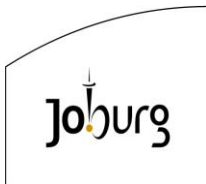
- 3.1 Full Name of bidder or his or her representative:.....
- 3.2 Identity Number:.....
- 3.3 Position occupied in the Company (director, trustee, shareholder²):.....
- 3.4 Company Registration Number:
- 3.5 Tax Reference Number:.....
- 3.6 VAT Registration Number:
- 3.7 The names of all directors / trustees / shareholders members, their individual identity numbers and state employee numbers must be indicated in paragraph 4 below.
- 3.8 Are you presently in the service of the state? **YES / NO**
 - 3.8.1 If yes, furnish particulars.

¹MSCM Regulations: "in the service of the state" means to be –

- (a) a member of –
 - (i) any municipal council.
 - (ii) any provincial legislature; or
 - (iii) the national Assembly or the national Council of provinces.
- (b) a member of the board of directors of any municipal entity.
- (c) an official of any municipality or municipal entity.
- (d) an employee of any national or provincial department, national or provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act No.1 of 1999).
- (e) a member of the accounting authority of any national or provincial public entity; or
- (f) an employee of Parliament or a provincial legislature.

² Shareholder" means a person who owns shares in the company and is actively involved in the management of the company or business and exercises control over the company.

- 3.9 Have you been in the service of the state for the past twelve months? YES / NO
 - 3.9.1 If yes, furnish particulars.....
- 3.10 Do you have any relationship (family, friend, other) with persons in the service of the state and who may be involved with the evaluation and or adjudication of this bid?
..... YES / NO
 - 3.10.1 If yes, furnish particulars.....



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3.11 Are you, aware of any relationship (family, friend, other) between any other bidder and any persons in the service of the state who may be involved with the evaluation and or adjudication of this bid? YES / NO

3.11.1 If yes, furnish particulars.....
.....

3.12 Are any of the company's directors, trustees, managers, principle shareholders or stakeholders in service of the state? YES / NO

3.12.1 If yes, furnish particulars.....
.....

3.13 Are any spouse, child or parent of the company's directors trustees, managers, principle shareholders or stakeholders in service of the state? YES / NO

3.13.1 If yes, furnish particulars.....
.....

3.14 Do you or any of the directors, trustees, managers, principle shareholders, or stakeholders of this company have any interest in any other related companies or business whether or not they are bidding for this contract. YES / NO

3.14.1 If yes, furnish particulars:.....
.....

4. Full details of directors / trustees / members / shareholders.

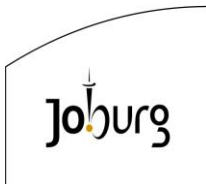
Full Name	Identity Number	State Employee Number

.....
Signature

.....
Date

.....
Capacity

.....
Name of Bidder

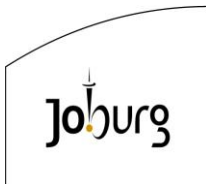


MBD 8

DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES

- 1 The bid of any bidder may be disregarded if that bidder, or any of its directors have-
 - a. abused the institution's supply chain management system;
 - b. committed fraud or any other improper conduct in relation to such system; or
 - c. failed to perform on any previous contract.
- 2 In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.

Item	Question	Yes	No
4.1	Is the bidder or any of its directors listed on the National Treasury's database as companies or persons prohibited from doing business with the public sector? (Companies or persons who are listed on this database were informed in writing of this restriction by the National Treasury after the <i>audi alteram partem</i> rule was applied).	Yes ☐	No ☐
4.1.1	If so, furnish particulars:		
4.2	Is the bidder or any of its directors listed on the Register for Tender Defaulters in terms of section 29 of the Prevention and Combating of Corrupt Activities Act (No 12 of 2004)? To access this Register, enter the National Treasury's website, www.treasury.gov.za, click on the icon "Register for Tender Defaulters" or submit your written request for a hard copy of the Register to facsimile number (012) 3265445.	Yes ☐	No ☐
4.2.1	If so, furnish particulars:		
4.3	Was the bidder or any of its directors convicted by a court of law (including a court outside of the Republic of South Africa) for fraud or corruption during the past five years?	Yes ☐	No ☐
4.3.1	If so, furnish particulars:		
4.4	Was any contract between the bidder and any organ of state terminated during the past five years on account of failure to perform on or comply with the contract?	Yes ☐	No ☐
4.4.1	If so, furnish particulars:		



CERTIFICATION

I, THE UNDERSIGNED (FULL NAME)

CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION
FORM IS TRUE AND CORRECT.

I ACCEPT THAT, IN ADDITION TO CANCELLATION OF A CONTRACT, ACTION
MAY BE TAKEN AGAINST ME SHOULD THIS DECLARATION PROVE TO BE
FALSE.

.....

Signature

.....

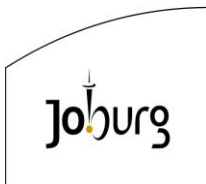
Date

.....

Position

.....

Name of Bidder

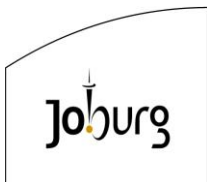


MBD 5

DECLARATION FOR PROCUREMENT ABOVE R10 MILLION (VAT INCLUDED)

For all procurement expected to exceed R10 million (VAT included), bidders must complete the following questionnaire:

- 1 Are you by law required to prepare annual financial statements for auditing? **YES / NO**
 - 1.1 If yes, submit audited annual financial statements for the past three years or since the date of establishment if established during the past three years.....
.....
- 2 If the bidder is not required by law to prepare annual financial statements for auditing, they shall be required to furnish their Annual Financial Statements -
 - i. for the past three years , or
 - ii. since their establishment if established during the past three years
 - 2.1 Do you have any outstanding undisputed commitments for municipal services towards a municipality or any other service provider in respect of which payment is overdue for more than 30 days?
YES / NO
 - 2.2 If no, this serves to certify that the bidder has no undisputed commitments for municipal services towards a municipality or other service provider in respect of which payment is overdue for more than 30 days.
 - 2.3 If yes, provide particulars.....
.....
- 3 Has any contract been awarded to you by an organ of state during the past five years, including particulars of any material non-compliance or dispute concerning the execution of such contract? **YES / NO**
 - 3.1 If yes, furnish particulars.....
.....
- 4 Will any portion of goods or services be sourced from outside the Republic, and, if so, what portion and whether any portion of payment from the municipality / municipal entity is expected to be transferred out of the Republic? **YES / NO**
 - 4.1 If yes, furnish particulars.....
.....



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CERTIFICATION

I, THE UNDERSIGNED (NAME)

.....

**CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM IS
CORRECT.**

**I ACCEPT THAT THE STATE MAY ACT AGAINST ME SHOULD THIS DECLARATION
PROVE TO BE**

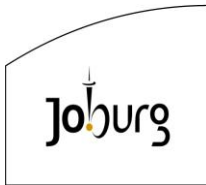
FALSE.

.....
Signature

.....
Date

.....
Position

.....
Name of Bidder



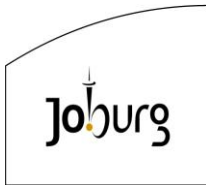
MBD 9

CERTIFICATE OF INDEPENDENT BID DETERMINATION

1. This Municipal Bidding Document (MBD) must form part of all bids¹ invited.
2. Section 4 (1) (b) (iii) of the Competition Act No. 89 of 1998, as amended, prohibits an agreement between, or concerted practice by, firms, or a decision by an association of firms, if it is between parties in a horizontal relationship and if it involves collusive bidding (or bid rigging)². Collusive bidding is a *pe se* prohibition meaning that it cannot be justified under any grounds.
3. Municipal Supply Regulation 38 (1) prescribes that a supply chain management policy must provide measures for the combating of abuse of the supply chain management system, and must enable the accounting officer, among others, to:
 - a. take all reasonable steps to prevent such abuse;
 - b. reject the bid of any bidder if that bidder or any of its directors has abused the supply chain management system of the municipality or municipal entity or has committed any improper conduct in relation to such system; and
 - c. cancel a contract awarded to a person if the person committed any corrupt or fraudulent act during the bidding process or the execution of the contract.
4. This MBD serves as a certificate of declaration that would be used by institutions to ensure that, when bids are considered, reasonable steps are taken to prevent any form of bid-rigging.
5. In order to give effect to the above, the attached Certificate of Bid Determination (MBD9) must be completed and submitted with the bid:

¹ Includes price quotations, advertised competitive bids, limited bids and proposals.

² Bid rigging (or collusive bidding) occurs when businesses, that would otherwise be expected to compete, secretly conspire to raise prices or lower the quality of goods and / or services for purchasers who wish to acquire goods and / or services through a bidding process. Bid rigging is, therefore, an agreement between competitors not to compete.



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MBD 9

CERTIFICATE OF INDEPENDENT BID DETERMINATION

I, the undersigned, in submitting the accompanying bid:

(Bid Number and Description) in response to the invitation for the bid made by:

(Name of Municipality / Municipal Entity) do hereby make the following statements that I certify to be true and complete in every respect:

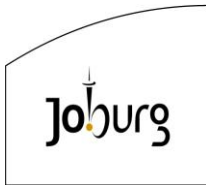
I certify, on behalf of

_____ that:

(Name of Bidder)

1. I have read, and I understand the contents of this Certificate.
2. I understand that the accompanying bid will be disqualified if this Certificate is found not to be true and complete in every respect.
3. I am authorized by the bidder to sign this Certificate, and to submit the accompanying bid, on behalf of the bidder.
4. Each person whose signature appears on the accompanying bid has been authorized by the bidder to determine the terms of, and to sign, the bid, on behalf of the bidder.
5. For the purposes of this Certificate and the accompanying bid, I understand that the word "competitor" shall include any individual or organization, other than the bidder, whether or not affiliated with the bidder, who:
 - (a) has been requested to submit a bid in response to this bid invitation.
 - (b) could potentially submit a bid in response to this bid invitation, based on their qualifications, abilities or experience; and
 - (c) provides the same goods and services as the bidder and/or is in the same line of business as the bidder
6. The bidder has arrived at the accompanying bid independently from, and without consultation, communication, agreement or arrangement with any competitor. However, communication between partners in a joint venture or consortium³ will not be construed as collusive bidding.
7. In particular, without limiting the generality of paragraphs 6 above, there has been no consultation, communication, agreement or arrangement with any competitor regarding:

³ Joint venture or Consortium means an association of persons for the purpose of combining their expertise, property, capital, efforts, skill and knowledge in an activity for the execution of a contract.



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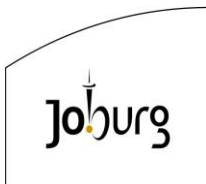
- (a) prices.
 - (b) geographical area where product or service will be rendered (market allocation)
 - (c) methods, factors or formulas used to calculate prices.
 - (d) the intention or decision to submit or not to submit, a bid.
 - (e) the submission of a bid which does not meet the specifications and conditions of the bid; or
 - (f) bidding with the intention not to win the bid.
8. In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications and conditions or delivery particulars of the products or services to which this bid invitation relates.
9. The terms of the accompanying bid have not been, and will not be, disclosed by the bidder, directly or indirectly, to any competitor, prior to the date and time of the official bid opening or of the awarding of the contract.
10. I am aware that, in addition and without prejudice to any other remedy provided to combat any restrictive practices related to bids and contracts, bids that are suspicious will be reported to the Competition Commission for investigation and possible imposition of administrative penalties in terms of section 59 of the Competition Act No. 89 of 1998 and or may be reported to the National Prosecuting Authority (NPA) for criminal investigation and or may be restricted from conducting business with the public sector for a period not exceeding ten (10) years in terms of the Prevention and Combating of Corrupt Activities Act No. 12 of 2004 or any other applicable legislation.

.....
Signature

.....
Date

.....
Position

.....
Name of Bidder



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T2.1.5 Proposed Amendments and Qualifications

The Tenderer should record any deviations or qualifications he may wish to make to the tender documents in this Returnable Schedule. Alternatively, a tenderer may state such qualifications in a covering letter to his tender and reference such letter in this schedule.

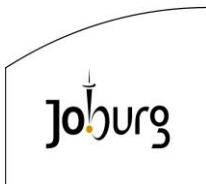
The Tenderer's attention is drawn to clause C.3.8 of the Standard Conditions of Tender referenced in the Tender Data regarding the employer's handling of material qualifications.

Page	Clause or item	Proposal

Signed _____ Date _____

Name _____ Position _____

Tenderer _____



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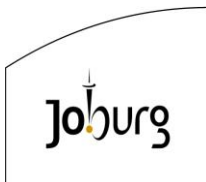
T2.1.6 Schedule of the Tenderer's Experience

EMPLOYER: CONTACT PERSON AND TELEPHONE NUMBER	EMPLOYER'S AGENT OR REPRESENTATIVE: CONTACT PERSON AND TELEPHONE NUMBER	NATURE OF WORK	VALUE OF WORK (inclusive of VAT)	DATE COMPLETED OR EXPECTED TO BE COMPLETED

Signed _____ Date _____

Name _____ Position _____

<i>Tenderer</i>	



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T 2.1.7 CONTACTABLE REFERENCE

To Johannesburg Water (SOC) Ltd (Mechanical Project)

CRITERIA 1

I, the undersigned being duly authorised to do so, hereby furnish a reference to Johannesburg Water relative to tender Contract No. **JW13897** for the **Expansion of Capacity Unit 5 – Installation of Mechanical and Electrical Equipment**

Name of Tenderer:

Description of Services provided:

.....
.....
.....
.....
.....

Contract Value

Name of authorized person:

Signature :.....**Date**

Telephone/Mobile:

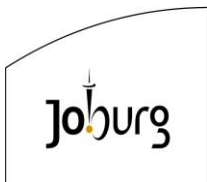
.....

Email:

Completed on behalf (Name of Client)

.....

NB: This document must be completed by the referee and included in the tender submission. Alternatively, the client's letterhead may be used for this purpose provided it complies with the functional criteria requirements. A separate form must be completed for each reference as required in the evaluation criteria. Information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting and restriction from participating in any future government tender.



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T 2.1.7 CONTACTABLE REFERENCE

To Johannesburg Water (SOC) Ltd (Mechanical Project)

CRITERIA 1

I, the undersigned being duly authorised to do so, hereby furnish a reference to Johannesburg Water relative to tender Contract No. **JW13897** for the **Expansion of Capacity Unit 5 – Installation of Mechanical and Electrical Equipment**

Name of Tenderer:

Description of Services provided:

.....
.....
.....
.....
.....

Contract Value

Name of authorized person:

Signature :.....Date

Telephone/Mobile:

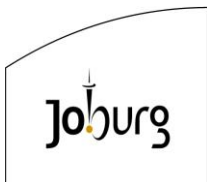
.....

Email:

Completed on behalf (Name of Client)

.....

NB: This document must be completed by the referee and included in the tender submission. Alternatively, the client's letterhead may be used for this purpose provided it complies with the functional criteria requirements. A separate form must be completed for each reference as required in the evaluation criteria. Information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting and restriction from participating in any future government tender.



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T 2.1.7 CONTACTABLE REFERENCE

To Johannesburg Water (SOC) Ltd (Electrical Project)

CRITERIA 2

I, the undersigned being duly authorised to do so, hereby furnish a reference to Johannesburg Water relative to tender Contract No. **JW13897 for the Expansion of Capacity Unit 5 – Installation of Mechanical and Electrical Equipment**

Name of Tenderer:

Description of Services provided:

.....
.....
.....
.....
.....

Contract Value.....

Name of authorized person:

Signature :.....**Date**

Telephone/Mobile:

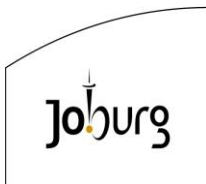
.....

Email:

Completed on behalf (Name of Client)

.....

NB: This document must be completed by the referee and included in the tender submission. Alternatively, the client's letterhead may be used for this purpose provided it complies with the functional criteria requirements. A separate form must be completed for each reference as required in the evaluation criteria. Information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting and restriction from participating in any future government tender.



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T 2.1.8 SCHEDULE OF KEY PERSONNEL

In terms of the Project Specification and the Conditions of Tender, unskilled workers may only be brought in from outside the local community if such personnel are not available locally.

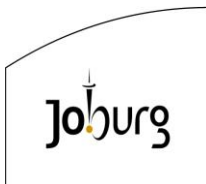
The Tenderer shall list below the personnel which they intend to utilize on the Works, including key personnel which may have to be brought in from outside if not available locally.

CATEGORY OF EMPLOYEE	NUMBER OF PERSONS					
	KEY PERSONNEL, PART OF THE TENDERER'S ORGANISATION		KEY PERSONNEL TO BE IMPORTED IF NOT AVAILABLE LOCALLY		UNSKILLED PERSON- NEL TO BE RE- CRUITED FROM LOCAL COMMUNITY	
	HDI	NON-HDI	HDI	NON-HDI	HDI	NON-HDI
Site Agent, Contracts Manager						
Foremen, Quality Control and Safety Personnel						
Technicians, Surveyors, etc.						
Artisans and other Skilled workers						
Plant Operators						
Unskilled Workers						
Others:						

SIGNATURE:.....

DATE:

(of person authorized to sign on behalf of the Tenderer)



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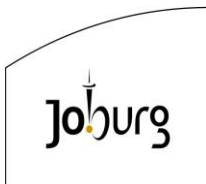
**Volume 1 Tender and Contract
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Project Name and Locality	
Project Dates and Value	
Project Position (e.g. Project Manager, Engineer, etc.)	
Description of Scope and Duties	

Project Name and Locality	
Project Dates and Value	
Project Position (e.g. Project Manager, Engineer, etc.)	
Description of Scope and duties	

Project Name and Locality	
Project Position (e.g. Project Manager, Engineer, etc.)	
Description of Scope and duties	

Project Name and Locality	
Project Dates and Value	
Project Position (e.g. Project Manager, Engineer, etc.)	
Description of Scope and duties	



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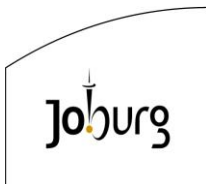
Volume 1 Tender and Contract
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Project Name and Locality	
Project Dates and Value	
Project Position (e.g. Project Manager, Engineer, etc.)	
Description of Scope and duties	

I,....., hereby declare that I am aware of the inclusion of my Curriculum Vita in the proposed project team and make myself available for this project.

Signature :

Date :



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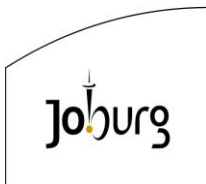
Project Dates and Value	
Project Position (e.g. Project Manager, Engineer, etc.)	
Description of Scope and Duties	

Project Name and Locality	
Project Dates and Value	
Project Position (e.g. Project Manager, Engineer, etc.)	
Description of Scope and duties	

Project Name and Locality	
Project Position (e.g. Project Manager, Engineer, etc.)	
Description of Scope and duties	

Project Name and Locality	
Project Dates and Value	
Project Position (e.g. Project Manager, Engineer, etc.)	
Description of Scope and duties	

Project Name and Locality	
Project Dates and Value	
Project Position (e.g. Project Manager, Engineer, etc.)	



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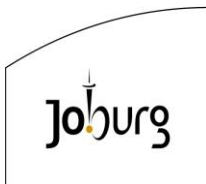
Volume 1 Tender and Contract
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Description of Scope and duties	

I,....., hereby declare that I am aware of the inclusion of my Curriculum Vita in the proposed project team and make myself available for this project.

Signature :

Date :



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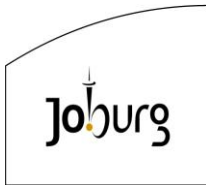
Project Name and Locality	
Project Dates and Value	
Project Position (e.g. Project Manager, Engineer, etc.)	
Description of Scope and Duties	

Project Name and Locality	
Project Dates and Value	
Project Position (e.g. Project Manager, Engineer, etc.)	
Description of Scope and duties	

Project Name and Locality	
Project Position (e.g. Project Manager, Engineer, etc.)	
Description of Scope and duties	

Project Name and Locality	
Project Dates and Value	
Project Position (e.g. Project Manager, Engineer, etc.)	
Description of Scope and duties	

Project Name and Locality	
Project Dates and Value	
Project Position (e.g. Project Manager, Engineer, etc.)	



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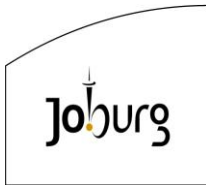
Volume 1 Tender and Contract
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Description of Scope and duties	

I,....., hereby declare that I am aware of the inclusion of my Curriculum Vita in the proposed project team and make myself available for this project.

Signature :

Date :

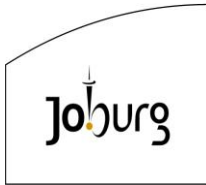


T2.1.10 SITE SPECIFIC METHOD STATEMENT

Tenderer must provide **Site Specific** Method Statement Which Addresses the following sections:

- **Quality Control Plan** (Minimum 1 Page -Maximum 4 pages) including all necessary **standards** to be used, resources available and procedures to ensure quality. This is inclusive of the following major components,
 - procurement, manufacturing, installation & commissioning;
 - Examples of Quality Control Plans;
 - Company Policies and ISO registration.

- **Project Programme/Schedule** (On MS Projects or any other Gantt chart as Annexure) outlining critical path, aligned to the scope of works, aligned to the contractual timelines, and including all contractual dates. This is inclusive of the following major components,
 - Aerators, mixers, pumps, settling tanks bridges, screens.
 - Motor Control Panels and PLC's, designs and approvals, manufacturing, testing, installation, commissioning
 - procurement, manufacturing, and installation of all mechanical and electrical equipment
 - testing and commissioning of complete equipment
 - 24-month period



T2.2.1 Contractor's Certificate of Registration With CIDB

NB: The Tenderer shall attach hereto the Contractor's Certificate of Registration with CIDB OR provide the CIDB registration number that JW can use to verify CIDB requirements for this tender. Failure to submit the certificate or CIDB registration number with the tender document will lead to the conclusion that the Tenderer is not registered with the CIDB and therefore not eligible to tender.

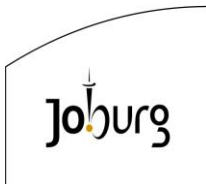
Tenderers who have made application to CIDB for registration and are capable of being so registered prior to the evaluation of submissions must attach a notification from CIDB that their application is being considered.

CIDB status to be active at the required CIDB grading at time of evaluation to avoid disqualification.

SIGNATURE:

DATE:

(of person authorized to sign on behalf of the Tenderer)



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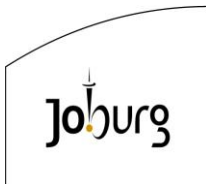
T2.2.2 SARS Tax Compliance Status Pin and Proof of CSD registration

The Tenderer must attach hereto a copy SARS Tax Compliance Status Pin and Proof of CSD registration i.e. MA xxxxxxxxxxxx number.

SIGNATURE:
.....

DATE:

(of person authorized to sign on behalf of the Tenderer)



T2.3.1 JW 6.4 Returnable Annexure A: Acknowledgement of SHE Specification & Annexures

DECLARATION BY CONTRACTOR

I, the undersigned, and representing the tenderer as indicated hereby acknowledge that I have obtained copies of the following listed documentation and confirm that I fully understand the contents thereof and confirm compliance thereto in the event of being successful:

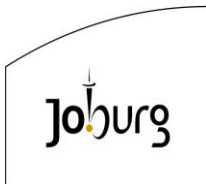
- OHS Specification (Volume 2)
- Annexure 1: Baseline Risk Assessment
- Annexure 2: Medical Screening Policy
- Annexure 3: Sign off form
- Annexure 4: Environmental Management Plan

We furthermore commit to:

- Comply with all applicable SHE related legal and other requirements.
- Inform all staff of their role in managing environmental impacts and safety hazards on site.

Signed at on this Day of 20.....

Name of tenderer	
Name of Authorized person	
Authorized Signature*	



T2.3.2 JW 6.5 Returnable Annexure B: Acknowledgement of Tender Drawings

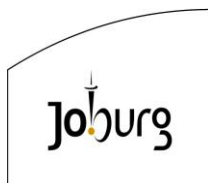
DECLARATION BY CONTRACTOR

I, the undersigned, and representing the tenderer as indicated hereby acknowledge that I have obtained copies of the following listed documentation and confirm that I fully understand the contents thereof and confirm compliance thereto in the event of being successful:

The drawings that are issued for **TENDER PURPOSES** are those noted below:

MECHANICAL :

DRAWINGS REQUIRED FOR MECHANICAL TENDER	
Description	Drawing No
GENERAL	
LIST OF DRAWNGS	303000141/12-001
SITE PLAN	303000141/12-006
PROJECT NOTICE BOARDS	303000141/12-007
PROCESS AND INSTRUMENTATION DRAWINGS	
LEGEND	303000141/12-021
PRIMARY SEDIMENTATION TANKS	303000141/12-022
SLUDGE FERMENTATION PLANT	303000141/12-023
WASTE SLUDGE THICKENERS	303000141/12-024
BALANCING TANK	303000141/12-025
REACTOR 2	303000141/12-026
FERROUS AND FERRIC DOSING PLANTS	303000141/12-027
DISINFECTION DOSING PLANT	303000141/12-028
ONLINE MONITORING OF FINAL AND REACTOR EFFLUENT	303000141/12-029
SLUDGE FERMENTATION ODOUR CONTROL PLANT	303000141/12-038
LAYOUTS	
SITE LAYOUT GENERAL ARRANGEMENT	303000141/12-041
ARCHITECTURAL	
HYPOCHLORITE PUMPSTATION BUND & PUMPS	303000141/12-073
ELUTRIATION PUMP STATION	303000141/12-074
EFFLUENT PUMP STATION CONCRETE AND BUILDING LAYOUT	303000141/12-081
PRIMARY SEDIMENTATION TANKS — STRUCTURAL	
PRIMARY SEDIMENTATION TANKS SHEET 1 OF 2	303000141/12-111
PRIMARY SEDIMENTATION TANKS SHEET 2 OF 2	303000141/12-112
FERMENTATION TERRACE STRUCTURAL	
FERMENTATION THICKENER	303000141/12-141

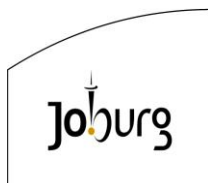


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ELUTRIATION PUMPSTATION	303000141/12-150
MIXING TANK	303000141/12-154
EXTENSION TO EXISTING ELUTRIATION PUMP STATION	303000141/12-157
FERMENTATION TERRACE PIPEWORK	
FERMENTATION TERRACE ELUTRIATION EFFLUENT & THICKENED SLUDGE PIPES	303000141/12-171
BALANCING TANK STRUCTURAL	
BALANCING TANK SHEET 1 OF 5	303000141/12-201
BALANCING TANK SHEET 3 OF 5	303000141/12-203
REACTOR - STRUCTURAL	
REACTOR DETAILS OF INTERNAL WALLS SHEET 1 OF 3 AND RECYCLE A PUMPSTATION	303000141/12-303
REACTOR DETAILS OF INTERNAL WALLS SHEET 2 OF 3	303000141/12-304
REACTOR DETAILS OF INTERNAL WALLS SHEET 3 OF 3 AND RECYCLE B PUMPSTATION	303000141/12-305
REACTOR PLATFORMS AND BRIDGES	303000141/12-306
REACTOR FLOOR SLAB	303000141/12-307
REACTOR PLATFORM AND BRIDGES	303000141/12-309
REACTOR ARCHIMEDES SCREW PUMPSTATION	303000141/12-312
REACTOR ARCHIMEDES SCREW PUMPSTATION	303000141/12-313
CLARIFIERS — STRUCTURAL	
CLARIFIER SHEET 1 OF 2	303000141/12-401
CLARIFIER SHEET 2 OF 2	303000141/12-413
CLARIFIERS — PIPEWORK	
CLARIFIER TERRACE FEED PIPES	303000141/12-434
EFFLUENT DISPOSAL — PIPEWORK	
DISINFECTION CONTACT TANK LAYOUT OF STEEL PIPES	303000141/12-473
EFFLUENT PUMP STATION	
EFFLUENT PUMPSTATION	303000141/12-485
WASTE SLUDGE TREATMENT — STRUCTURAL	
WASTE SLUDGE THICKENER SHEET 1 OF 2	303000141/12-508
WASTE SLUDGE THICKENER SHEET 2 OF 2	303000141/12-509
OTHER DETAILS	
NEW ELUTRATION PUMPSTATION - MECHANICAL	303000141/12-160
EXISTING ELUTRATION PUMPSTATION - MECHANICAL	303000141/12-161
EXISTING WAS PUMPSTATION - MECHANICAL	303000141/12-162



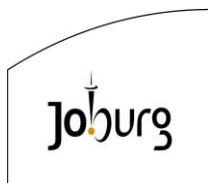
Contract JW13897
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ELECTRICAL :

JW Number	Consultant's Number	Description	Revision Number
JW-5E2-CR01	ING0645D-5E2-CR01	Unit 5 - Bioreactor 2 Site Plan Cable Route	T0
JW-5E2-CR02	ING0645D-5E2-CR02	Unit 5 - Bioreactor 2 Cable Routing	T0
JW-5E2-CR03	ING0645D-5E2-CR03	Unit 5 - Bioreactor 2 Clarifier Cable Routing	T0
JW-5E2-CR04	ING0645D-5E2-CR04	Unit 5 - Overall Site Plan Cable Route New,	T0
JW-5E2-GA02	ING0645D-5E2-GA02	Unit 5 - Bioreactor 2 MCC and MV Substation Small Power and Lighting	T0
JW-5E2-GA03	ING0645D-5E2-GA03	Unit 5 - Bioreactor 2 MCC and MV Substation Equipment and Cable Routing	T0
JW-5E2-GA04	ING0645D-5E2-GA04	Unit 5 - Bioreactor 2 Cable Routing	T0
JW-5E2-GA05	ING0645D-5E2-GA05	Unit 5 - Bioreactor 2 Generator Room Small	T0
JW-5E2-SM01	ING0645D-5E2-SM01	Unit 5 - Bioreactor 2 5E2-MCC-01 and 5E2-	T1
JW-5E2-SM02	ING0645D-5E2-SM02	Unit 5 - Bioreactor 2 Instrument DB -	T0
JW-5E2-SM03	ING0645D-5E2-SM03	Unit 5 - Bioreactor 2 Small Power and Lighting DB - Small Power and Lighting DB	T0
JW-5E2-SM04	ING0645D-5E2-SM04	Unit 5 - Bioreactor 2 Highmast 1, Highmast 2, Highmast 3 DBs Single	T0
JW-5E5-CR01	ING0645D-5E5-CR01	Hypochlorite Substation Cable Route	T0
JW-5E5-CR02	ING0645D-5E5-CR02	Final Effluent Cable Route	T0
JW-5E5-GA01	ING0645D-5E5-GA01	Hypochlorite 5E5-MCC-01 General Ar-	T0
JW-5E5-GA02	ING0645D-5E5-GA02	Final Effluent Pump Station MCC and	T0
JW-5E2-SM01	ING0645D-5E2-SM01	Hypochlorite 5E5-MCC-01 Single Line Dia-	T0
JW-5E7-CR01	ING0645D-5E7-CR01	Sedimentation and Balancing Tank Cable	T0
JW-5E7-GA01	ING0645D-5E7-GA01	PST and Balancing Tank 5E7-MCC-01	T0
JW-5E7-SM01	ING0645D-5E7-SM01	PST and Balancing Tank 5E7-MCC-01 Sin-	T0
JW-5E8-CR01	ING0645D-5E8-CR01	Unit 5 Phase 2 Fermentation Terrace Elutriation Effluent and Thickened	T0
JW-5E8-GA01	ING0645D-5E8-GA01	Unit 5 Phase 2 New Elutriation Pump Station 5E8-MCC-01 Gen-	T0
JW-5E8-GA02	ING0645D-5E8-GA02	Unit 5 Phase 2 New Elutriation Pump Station 5E8-MCC-02 Gen-	T0
JW-5E8-GA03	ING0645D-5E8-GA03	Unit 5 Phase 2 Fermentation Terrace Elutriation Effluent Pump Station Cable Route	T0
JW-5E8-SM01	ING0645D-5E8-SM01	Unit 5 Phase 2 Elutriation Pump Station	T0
JW-5E8-SM02	ING0645D-5E8-SM02	Unit 5 Phase 2 Elutriation Pump Station	T0
JW-5E8-SM03	ING0645D-5E8-SM03	Unit 5 Phase 2 Elutriation Instrument DB -	T0
JW-5E8-SM04	ING0645D-5E8-SM04	Unit 5 Phase 2 Elutriation Small Power and Lighting DB - Small Power and	T0
JW-5E9-CR01	ING0645D-5E9-CR01	Unit 5 Phase 2 Waste Activated Sludge	T0
JW-5E9-GA01	ING0645D-5E9-GA01	Unit 5 Phase 2 WAS Pump Station 5E9-	T0
JW-5E9-GA02	ING0645D-5E9-GA02	Unit 5 Phase 2 WAS Pump Station 5E9-	T0



Contract JW13897
Northern Wastewater Treatment Works
Expansion of Capacity Unit 5 – Installation of
Mechanical and Electrical Equipment

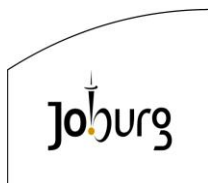


Volume 1 Tender and Contract
Section T2 Returnable Documents

JW-5E9-SM01	ING0645D-5E9-SM01	Unit 5 Phase 2 WAS Pump Station 5E9-	T0
JW-5E9-SM02	ING0645D-5E9-SM02	Unit 5 Phase 2 WAS Pump Station 5E9-	T0
JW-EE-SM01	ING0645D-EE-SM01	Unit 5 Module 2 Main Single Line Diagram	T0
JW-5E2-TYP S_D	ING0645D-5E2-TYP S_D	Unit 5 Bioreactor 2 Typical Star Delta Sche-	T0
JW-5E2-TYP IN-	ING0645D-5E2-TYP IN-	Unit 5 Bioreactor 2 Typical Incomer Sche-	T0
JW-5E2-FWD REV	ING0645D-5E2-FWD	Unit 5 Bioreactor 2 Typical Forward/Re-	T0
JW-5E2-TYP DOL	ING0645D-5E2-TYP DOL	Unit 5 Bioreactor 2 Typical DOL Sump	T0
JW-5E2-TYP DOL	ING0645D-5E2-TYP DOL	Unit 5 Bioreactor 2 Typical DOL Schematic	T0
Issued To:		Johannesburg Water	Size and

CONTROL & INSTRUMENTATION

Northern Works Unit 5 Module 2 - C&I Drawings (For Mod 2 Tender)			
Description	Consultants number	Drawing	JW Drawing number
General			
Cable Route	ING0645D-NET-CR02		JW13898-NET-CR02
Fibre Network Drawing	ING0645D-NET-CBD		JW13898-NET-CBD
U5 PST and Balancing Tank (01)			
PST P&ID Legend	ING0645D-01-P&ID-LEG-END		JW13898-01-P&ID-LEG-END
PST P&ID	ING0645D-01-022		JW13898-01-022
Balancing Tank P&ID	ING0645D-01-025		JW13898-01-025
PLC Panel Schematic	ING0645D-01-SLD		JW13898-01-SLD
DI Rack0 Slot2 Wiring Diagram A	ING0645D-01-R0S2A-DI		JW13898-01-R0S2A-DI
DI Rack0 Slot2 Wiring Diagram B	ING0645D-01-R0S2B-DI		JW13898-01-R0S2B-DI
DI Rack0 Slot2 Wiring Diagram C	ING0645D-01-R0S2C-DI		JW13898-01-R0S2C-DI
DI Rack0 Slot2 Wiring Diagram D	ING0645D-01-R0S2D-DI		JW13898-01-R0S2D-DI
DI Rack0 Slot3 Wiring Diagram A	ING0645D-01-R0S3A-DI		JW13898-01-R0S3A-DI
DO Rack0 Slot4 Wiring Diagram	ING0645D-01-R0S4-DO		JW13898-01-R2S4-DO
AI Rack0 Slot5 Wiring Diagram	ING0645D-01-R0S5-AI		JW13898-01-R0S5-AI
AI Rack0 Slot6 Wiring Diagram	ING0645D-01-R0S6-AI		JW13898-01-R0S6-AI
AO Rack0 Slot7 Wiring Diagram	ING0645D-01-R0S7-AO		JW13898-01-R0S7-AO
PST5 Underflow Valve Loop Drawing	ING0645D-01-CLV001		JW13898-01-CLV001
PST6 Underflow Valve Loop Drawing	ING0645D-01-CLV002		JW13898-01-CLV002
Balancing Tank 2 Outlet Sluice Gate Loop Drawing	ING0645D-01-FCV001		JW13898-01-FCV001
Balancing Tank 2 Inlet Sluice Gate Loop Drawing	ING0645D-01-FCV002		JW13898-01-FCV002
Balancing Tank 2 Outflow Loop Drawing	ING0645D-01-FIT002		JW13898-01-FIT002
BTK Flow Divider To Reactor 2 Flow Loop Drawing	ING0645D-01-FIT005		JW13898-01-FIT005

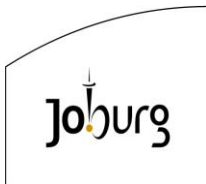


Contract JW13897
Northern Wastewater Treatment Works
Expansion of Capacity Unit 5 – Installation of
Mechanical and Electrical Equipment



Volume 1 Tender and Contract
Section T2 Returnable Documents

Balancing Tank 2 Inlet Chamber Level Loop Drawing	ING0645D-01-LIT003	JW13898-01-LIT003
Balancing Tank 2 Level Loop Drawing	ING0645D-01-LIT004	JW13898-01-LIT004
Balancing Tank 2 Level 2 Loop Drawing	ING0645D-01-LIT005	JW13898-01-LIT005
U5 WST (04)		
WST Schematic Diagram	ING0645D-04-SLD	JW13898-04-SLD
WST P&ID	ING0645D-04-024	JW13898-04-024
DO Rack0 Slot10 Wiring Diagram	ING0645D-04-R0S4A-DO	JW13898-04-R0S4A-DO
DI Rack0 Slot5 Wiring Diagram	ING0645D-04-R0S2A-DI	JW13898-04-R0S2A-DI
WST2 Underflow Valve Loop Drawing	ING0645D-04-CLV002	JW13898-04-CLV002
U5 Final Effluent PS (05)		
Final Effluent P&ID Legend	JW13898-05-P&ID-LEG-END	JW13898-05-P&ID-LEG-END
Disinfection P&ID	ING0645D-05-028	JW13898-05-028
Final Effluent P&ID	ING0645D-05-029	JW13898-05-029
Cable Block Diagram	ING0645D-CBD-05	JW13898-CBD-05
PLC Panel Schematic	ING0645D-05-SLD	JW13898-05-SLD
DI Rack0 Slot2A Wiring Diagram	ING0645D-05-R0S2A-DI	JW13898-05-R0S2A-DI
DI Rack0 Slot2B Wiring Diagram	ING0645D-05-R0S2B-DI	JW13898-05-R0S2B-DI
DO Rack0 Slot4 Wiring Diagram	ING0645D-05-R0S4A-DO	JW13898-05-R0S4A-DO
AI Rack0 Slot5 Wiring Diagram	ING0645D-05-R0S5-AI	JW13898-05-R0S5-AI
AI Rack0 Slot6 Wiring Diagram	ING0645D-05-R0S6-AI	JW13898-05-R0S6-AI
Orthophosphate Analyser Loop Drawing	ING0645D-05-AIT008	JW13898-05-AIT008
Ammonia Loop Drawing	ING0645D-05-AIT009	JW13898-05-AIT009
Chemical Oxygen Demand Loop Drawing	ING0645D-05-AIT010	JW13898-05-AIT010
Suspended Solids Loop Drawing	ING0645D-05-AIT011	JW13898-05-AIT011
pH Probe Loop Drawing	ING0645D-05-AIT012	JW13898-05-AIT012
Nitrate Probe Loop Drawing	ING0645D-05-AIT013	JW13898-05-AIT013
Conductivity Probe Loop Drawing	ING0645D-05-AIT014	JW13898-05-AIT014
Chlorine Analysers Loop Drawing	ING0645D-05-AIT015	JW13898-05-AIT015
Penstock 3 Loop Drawing	ING0645D-05-CLV003	JW13898-05-CLV003
Penstock 4 Loop Drawing	ING0645D-05-CLV004	JW13898-05-CLV004
U5 Hypochlorite (06)		
Chemical Dosing Tank 3 Level Loop Drawings	ING0645D-06-LIT003	JW13898-06-LIT003
U5 Main Intake Substation (07)		
Main Intake Sub Schematic Diagram	ING0645D-07-SLD	JW13898-07-SLD
Main Intake Sub Cable Block Diagram	ING0645D-07-CBD	JW13898-07-CBD
DI Rack0 Slot2A Wiring Diagram	ING0645D-07-R0S2A-DI	JW13898-07-R0S2A-DI
DI Rack0 Slot2A Wiring Diagram	ING0645D-07-R0S2B-DI	JW13898-07-R0S2B-DI
DI Rack0 Slot2A Wiring Diagram	ING0645D-07-R0S2C-DI	JW13898-07-R0S2C-DI
U5 Elutriation (08)		
Sludge Fermentation Plant P&ID Legend	ING0645D-08-P&ID-LEG-END	JW13898-08-P&ID-LEG-END
Sludge Fermentation Plant P&ID	ING0645D-08-023	JW13898-08-023
Elutriation Odour Control	ING0645D-08-038	JW13898-08-038

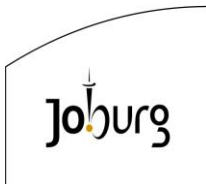


Contract JW13897
Northern Wastewater Treatment Works
Expansion of Capacity Unit 5 – Installation of
Mechanical and Electrical Equipment



Volume 1 Tender and Contract
Section T2 Returnable Documents

Sludge Fermentation Plant Cable Block Diagram	ING0645D-08-CBD	JW13898-08-CBD
Sludge Fermentation Plant Schematic Diagram	ING0645D-08-SLD	JW13898-08-SLD
AI Drop 1 Rack0 Slot2 Wiring Diagram	ING0645D-08-D1R0S2-AI	JW13898-08-D1R0S2-AI
AI Drop 1 Rack0 Slot3 Wiring Diagram	ING0645D-08-D1R0S3-AI	JW13898-08-D1R0S3-AI
AO Drop 1 Rack0 Slot5 Wiring Diagram	ING0645D-08-D1R0S5-AO	JW13898-08-D1R0S5-AO
DI Drop 1 Rack0 Slot6 Wiring Diagram	ING0645D-08-D1R0S6-DI	JW13898-08-D1R0S6-DI
DI Drop 1 Rack0 Slot7 Wiring Diagram	ING0645D-08-D1R0S7-DI	JW13898-08-D1R0S7-DI
DI Drop 1 Rack0 Slot8 Wiring Diagram	ING0645D-08-D1R0S8-DI	JW13898-08-D1R0S8-DI
DI Drop 1 Rack0 Slot9 Wiring Diagram	ING0645D-08-D1R0S9-DI	JW13898-08-D1R0S9-DI
DI Drop 1 Rack0 Slot10 Wiring Diagram	ING0645D-08-D1R0S10-DI	JW13898-08-D1R0S10-DI
DI Drop 1 Rack1 Slot1 Wiring Diagram	ING0645D-08-D1R1S1-DI	JW13898-08-D1R1S1-DI
DI Drop 1 Rack1 Slot2 Wiring Diagram	ING0645D-08-D1R1S2-DI	JW13898-08-D1R1S2-DI
DO Drop 1 Rack1 Slot6 Wiring Diagram	ING0645D-08-D1R1S6-DO	JW13898-08-D1R1S6-DO
DO Drop 1 Rack1 Slot7 Wiring Diagram	ING0645D-08-D1R1S7-DO	JW13898-08-D1R1S7-DO
DO Drop 1 Rack1 Slot8 Wiring Diagram	ING0645D-08-D1R1S8-DO	JW13898-08-D1R1S8-DO
Recirculation Sump1 Valve Loop Drawing	ING0645D-08-CLV001	JW13898-08-CLV001
Recycle Sump 1 Pump Flow Loop Drawing	ING0645D-08-FIT005	JW13898-08-FIT005
Recycle Sump 2 Pump Flow Loop Drawing	ING0645D-08-FIT006	JW13898-08-FIT006
Rec Sump1 Transfer Pumps Flow	ING0645D-08-FIT007	JW13898-08-FIT007
Recirculation Sump1 Level Loop Drawing	ING0645D-08-LIT005	JW13898-08-LIT005
DI Rack0 Slot2A Wiring Diagram	ING0645D-08-R0S2A-DI	JW13898-08-R0S2A-DI
DI Rack0 Slot2B Wiring Diagram	ING0645D-08-R0S2B-DI	JW13898-08-R0S2B-DI
DI Rack0 Slot2C Wiring Diagram	ING0645D-08-R0S2C-DI	JW13898-08-R0S2C-DI
DI Rack0 Slot2D Wiring Diagram	ING0645D-08-R0S2D-DI	JW13898-08-R0S2D-DI
DI Rack0 Slot3A Wiring Diagram	ING0645D-08-R0S3A-DI	JW13898-08-R0S3A-DI
DI Rack0 Slot3B Wiring Diagram	ING0645D-08-R0S3B-DI	JW13898-08-R0S3B-DI
DI Rack0 Slot3C Wiring Diagram	ING0645D-08-R0S3C-DI	JW13898-08-R0S3C-DI
DO Rack0 Slot6A Wiring Diagram	ING0645D-08-R0S6A-DO	JW13898-08-R0S6A-DO
DO Rack0 Slot6B Wiring Diagram	ING0645D-08-R0S6B-DO	JW13898-08-R0S6B-DO
AI Rack0 Slot7 Wiring Diagram	ING0645D-08-R0S7-AI	JW13898-08-R0S7-AI
AI Rack0 Slot8 Wiring Diagram	ING0645D-08-R0S8-AI	JW13898-08-R0S8-AI
AI Rack0 Slot9 Wiring Diagram	ING0645D-08-R0S9-AI	JW13898-08-R0S9-AI
AO Rack0 Slot10 Wiring Diagram	ING0645D-08-R0S10-AO	JW13898-08-R0S10-AO
Recirculation Sump2 Valve Loop Drawing	ING0645D-08-CLV002	JW13898-08-CLV002
Sludge from PSTs Flow Loop Drawing	ING0645D-08-FIT001	JW13898-08-FIT001
Elutriant Sump 1 Pump Flow Loop Drawing	ING0645D-08-FIT002	JW13898-08-FIT002
Transfer Pumps Flow Loop Drawing	ING0645D-08-FIT008	JW13898-08-FIT008
Elutriant Pump Flow Loop Drawing	ING0645D-08-FIT009	JW13898-08-FIT009
O Control Recirculation Flow Loop Drawing	ING0645D-08-FIT010	JW13898-08-FIT010
O Control Effluent Flow Loop Drawing	ING0645D-08-FIT011	JW13898-08-FIT011
O Control Drain Flow Loop Drawing	ING0645D-08-FIT012	JW13898-08-FIT012
Recirculation Sump2 Pump1 Flow	ING0645D-08-FIT013	JW13898-08-FIT013
Recirculation Sump2 Pump2 Flow	ING0645D-08-FIT014	JW13898-08-FIT014

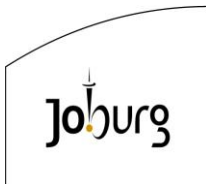


Contract JW13897
Northern Wastewater Treatment Works
Expansion of Capacity Unit 5 – Installation of
Mechanical and Electrical Equipment



Volume 1 Tender and Contract
Section T2 Returnable Documents

Wasting Pump1 Flow	ING0645D-08-FIT015	JW13898-08-FIT015
Wasting Pump2 Flow	ING0645D-08-FIT016	JW13898-08-FIT016
Wasting Pump3 Flow	ING0645D-08-FIT017	JW13898-08-FIT017
Odour Control Gas Flow	ING0645D-08-FIT018	JW13898-08-FIT018
Mixing Tank 2 Level Loop Drawing	ING0645D-08-LIT006	JW13898-08-LIT006
Recirculation Sump2 Level Loop Drawing	ING0645D-08-LIT007	JW13898-08-LIT007
Sludge Holding Tank Level Loop Drawing	ING0645D-08-LIT008	JW13898-08-LIT008
Odour Control Effluent Tank Level Loop Drawing	ING0645D-08-LIT009	JW13898-08-LIT009
U5 Module 2 (80)		
Bioreactor 2 P&ID Legend	ING0645D-80-P&ID-LEG-END	JW13898-80-P&ID-LEG-END
Bioreactor 2 P&ID	ING0645D-80-026	JW13898-80-026
Ferrous and Ferric Dosing P&ID	ING0645D-80-027	JW13898-80-027
On-Line Monitoring fo Bioreactors 1&2 Effluent	ING0645D-80-028	JW13898-80-028
Bioreactor 2 Cable Block Diagram	ING0645D-CBD-80	JW13898-CBD-80
Bioreactor 2 PLC Panel Schematic	ING0645D-80-SLD	JW13898-80-SLD
DI Rack0 Slot2 Wiring Diagram A	ING0645D-80-R0S2A-DI	JW13898-80-R0S2A-DI
DI Rack0 Slot2 Wiring Diagram B	ING0645D-80-R0S2B-DI	JW13898-80-R0S2B-DI
DI Rack0 Slot2 Wiring Diagram C	ING0645D-80-R0S2C-DI	JW13898-80-R0S2C-DI
DI Rack0 Slot2 Wiring Diagram D	ING0645D-80-R0S2D-DI	JW13898-80-R0S2D-DI
DI Rack0 Slot3 Wiring Diagram A	ING0645D-80-R0S3A-DI	JW13898-80-R0S3A-DI
DI Rack0 Slot3 Wiring Diagram B	ING0645D-80-R0S3B-DI	JW13898-80-R0S3B-DI
DI Rack0 Slot3 Wiring Diagram C	ING0645D-80-R0S3C-DI	JW13898-80-R0S3C-DI
DI Rack0 Slot3 Wiring Diagram D	ING0645D-80-R0S3D-DI	JW13898-80-R0S3D-DI
DI Rack0 Slot4 Wiring Diagram A	ING0645D-80-R0S4A-DI	JW13898-80-R0S4A-DI
DI Rack0 Slot4 Wiring Diagram B	ING0645D-80-R0S4B-DI	JW13898-80-R0S4B-DI
DI Rack0 Slot4 Wiring Diagram C	ING0645D-80-R0S4C-DI	JW13898-80-R0S4C-DI
DI Rack0 Slot4 Wiring Diagram D	ING0645D-80-R0S4D-DI	JW13898-80-R0S4D-DI
DI Rack0 Slot5 Wiring Diagram A	ING0645D-80-R0S5A-DI	JW13898-80-R0S5A-DI
DI Rack0 Slot5 Wiring Diagram B	ING0645D-80-R0S5B-DI	JW13898-80-R0S5B-DI
DO Rack1Slot0 Wiring Diagram A	ING0645D-80-R1S0A-DO	JW13898-80-R1S0A-DO
DO Rack1Slot0 Wiring Diagram B	ING0645D-80-R1S0B-DO	JW13898-80-R1S0B-DO
DO Rack1Slot1 Wiring Diagram A	ING0645D-80-R1S1A-DO	JW13898-80-R1S1A-DO
AI Rack1 Slot3 Wiring Diagram	ING0645D-80-R1S2-AI	JW13898-80-R1S3-AI
AI Rack1 Slot4 Wiring Diagram	ING0645D-80-R1S3-AI	JW13898-80-R1S4-AI
AI Rack1 Slot5 Wiring Diagram	ING0645D-80-R1S3-AI	JW13898-80-R1S5-AI
AO Rack1 Slot6 Wiring Diagram	ING0645D-80-R1S5-AO	JW13898-80-R1S6-AO
Mixed Liquor Suspended Solids Loop Drawing	ING0645D-80-AIT001	JW13898-80-AIT001
Dissolved Oxygen 1 Loop Drawing	ING0645D-80-AIT002	JW13898-80-AIT002
Dissolved Oxygen 2 Loop Drawing	ING0645D-80-AIT003	JW13898-80-AIT003
Dissolved Oxygen 3 Loop Drawing	ING0645D-80-AIT004	JW13898-80-AIT004
Bio 1 and 2 Phosphate Loop Drawing	ING0645D-80-AIT005&AIT009	JW13898-80-AIT005&AIT009
Bio 1 and 2 Ammonia Loop Drawing	ING0645D-80-AIT005&AIT010	JW13898-80-AIT006&AIT010



Contract JW13897
Northern Wastewater Treatment Works
Expansion of Capacity Unit 5 – Installation of
Mechanical and Electrical Equipment

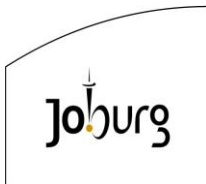


Volume 1 Tender and Contract
Section T2 Returnable Documents

Bio 1 SS Loop Drawing	ING0645D-80-AIT007	JW13898-80-AIT007
Bio 1 COD Loop Drawing	ING0645D-80-AIT008	JW13898-80-AIT008
Bio 2 SS Loop Drawing	ING0645D-80-AIT011	JW13898-80-AIT011
Bio 2 COD Loop Drawing	ING0645D-80-AIT012	JW13898-80-AIT012
WAS Flow Control Valve Loop Drawing	ING0645D-80-FCV001	JW13898-80-FCV001
RAS Flow Loop Drawing	ING0645D-80-FIT001	JW13898-80-FIT001
WAS Flow Loop Drawing	ING0645D-80-FIT002	JW13898-80-FIT002
Dosing Flow Loop Drawing	ING0645D-80-FIT003	JW13898-80-FIT003
Chemical Dosing Tank Level Loop Drawing	ING0645D-80-LIT002	JW13898-80-LIT001

Signed at on this Day of 20.....

Name of tenderer	
Name of Authorized person	
Authorized Signature*	



T2.3.3 JW 6.5 Returnable Annexure C: Acknowledgement of JW Technical Specifications

DECLARATION BY CONTRACTOR

I, the undersigned, and representing the tenderer as indicated hereby acknowledge that I have obtained copies of the following listed documentation and confirm that I fully understand the contents thereof and confirm compliance thereto in the event of being successful:

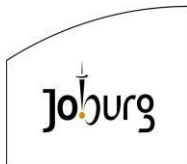
- Technical Specification
- The Pricing is according to tender specification

We furthermore commit to:

- Comply with all aspects of the Technical Specification

Signed at on this Day of 20.....

Name of tenderer	
Name of Authorized person	
Authorized Signature*	



CONTRACT: JW13897

**NORTHERN WASTEWATER TREATMENT WORKS
EXPANSION OF CAPACITY UNIT 5 – INSTALLATION OF
MECHANICAL AND ELECTRICAL EQUIPMENT**



Volume 1 Tender and Contract

Section C1 Agreement and Contract Data

Johannesburg Water (SOC) Ltd



CONTRACT: JW13897

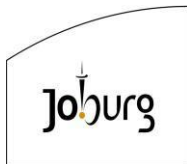
NORTHERN WASTEWATER TREATMENT WORKS

**EXPANSION OF CAPACITY UNIT 5 – INSTALLATION
OF MECHANICAL AND ELECTRICAL EQUIPMENT**

VOLUME 1

PART 1: AGREEMENT AND CONTRACT DATA

Employer:		Contractor:	
Witness:		Witness:	



CONTRACT: JW13897
NORTHERN WASTEWATER TREATMENT WORKS
EXPANSION OF CAPACITY UNIT 5 – INSTALLATION OF
MECHANICAL AND ELECTRICAL EQUIPMENT



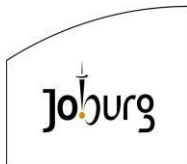
Volume 1 Tender and Contract

Section C1 Agreement and Contract Data

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Employer:		Contractor:	
Witness:		Witness:	



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Section C1 Agreement and Contract Data

C1.1 FORM OF OFFER (ACCEPTANCE & AGREEMENT)

C1.1.1 Form of Offer

The Contractor is to complete and sign the Form of Offer

The Employer, identified in the Acceptance signature block, has solicited offers to enter into a contract in respect of the following works:

CONTRACT NO. JW 13897; Northern Wastewater Treatment Works
Expansion of Capacity Unit 5 – Installation of Mechanical and Electrical Equipment

The Tenderer, identified in the Offer signature block below, has examined the documents listed in the Tender Data and addenda thereto as listed in the Tender 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 Contractor offers to perform all of the obligations and liabilities of the Contractor under the Contract including compliance with all its terms and conditions according to their true intent and meaning for an amount to be determined in accordance with the Conditions of Contract identified in the Contract Data.

THE OFFERED TOTAL OF THE PRICES INCLUSIVE OF VALUE ADDED TAX IS

Rand (in words); R _____ (in figures)

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 to the Contractor, whereupon the Contractor becomes the party named as the Contractor in the Conditions of Contract identified in the Contract Data.

Signature(s)

Name(s)

Capacity

For the Contractor

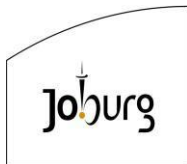
(Name and address of organisation)

**Name and signature of
witness**

(Name)

(Signature)

Employer:		Contractor:	
Witness:		Witness:	



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Date

C1.1.2 Form of Acceptance

The Employer is to complete and sign the form of acceptance.

By signing this part of the Form of Offer and Acceptance, the Employer identified below accepts the Contractor's Offer. In consideration thereof, the Employer shall pay the Contractor the amount due in accordance with the Conditions of Contract identified in the Contract Data. Acceptance of the Contractor's Offer shall form an agreement between the Employer and the Contractor 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 1 Agreement and Contract Data, (which includes this Agreement)
- Part 2 Pricing Data
- Part 3 Scope of Work
- Part 4 Site Information

and drawings, pricing schedules (Bill of Quantities) and documents or parts thereof, which may be incorporated by reference into Parts 1 to 4 above.

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 changes to the terms of the Offer agreed by the Contractor and the Employer during this process of offer and acceptance, are contained in the Schedule of Deviations attached to and forming part of this Agreement. No amendments to or deviations from said documents are valid unless contained in this Schedule, which must be duly signed by the authorised representative(s) of both parties.

The Contractor shall within twenty-eight **(28) days** after 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 Contact Data) to arrange the delivery of any 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 of this Agreement comes into effect. Failure to fulfil any of these obligations in accordance with those terms shall constitute a repudiation of this Agreement.

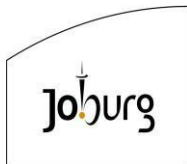
Notwithstanding anything contained herein, this Agreement comes into effect on the date when the Contractor receives one fully completed copy of this document, including the Schedule of Deviations (if any). Unless the Contractor (now the Contractor) within five days after the date of such receipt notifies 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.

FOR EMPLOYER OFFICIAL USE ONLY

Name(s)

Capacity

Employer:		Contractor:	
Witness:		Witness:	



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For the Employer Johannesburg Water SOC (Ltd), Turbine Hall, 65 Ntemi Piliso Street, Newtown.

(Name and address of organisation)

Name and signature of witness

(Name)

(Signature)

Date

C1.1.3 Schedule of Deviations

Notes:

1. The extent of deviations from the tender documents issued by the employer prior to the tender closing date is limited to those permitted in terms of the Conditions of Tender;
2. A Contractor's covering letter shall not be included in the final contract document. Should any matter in such letter, which constitutes a deviation as aforesaid become the subject of agreements reached during the process of offer and acceptance, the outcome of such agreement shall be recorded here;
3. Any other matter arising from the process of offer and acceptance either as a confirmation, clarification or change to the tender documents and which it is agreed by the Parties becomes an obligation of the contract shall also be recorded here; and
4. Any change or addition to the tender documents arising from the above arrangements and recorded here shall also be incorporated into the final draft of the Contract.

1 Subject

Details

2 Subject

Details

3 Subject

Details

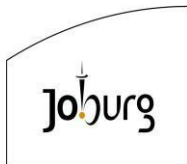
4 Subject

Details

5 Subject

Details

Employer:		Contractor:	
Witness:		Witness:	



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6 Subject

Details

7 Subject

Details

By the duly authorised representatives signing this Schedule of Deviations, the Employer and the Contractor agree to and accept the foregoing Schedule of deviations as the only deviations from and amendments to the documents listed in the Tender Data and addenda thereto as listed in the Tender Schedules, as well as any confirmation, clarification or change to the terms of the offer agreed by the Contractor and the Employer during the 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 Contractor of a completed and signed copy of this Agreement shall have any meaning or effect in the contract between the parties arising from this Agreement.

For the Contractor:

Signature(s)

Name(s)

Capacity

For the Contractor

(Name and address of organisation)

**Name and signature of
witness**

(Name)

(Signature)

Date

For the Employer:

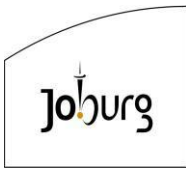
Name(s)

Capacity

For the Employer

**Johannesburg Water SOC (Ltd), Turbine Hall, 65 Ntemi Piliso Street,
Newtown**

Employer:		Contractor:	
Witness:		Witness:	



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(Name and address of organisation)

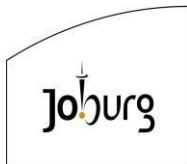
**Name and signature
of witness**

(Name)

(Signature)

Date

Employer:		Contractor:	
Witness:		Witness:	



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C1.2 CONTRACT DATA

C1.2.1 Part 1: Data Provided by the Employer

CONDITIONS OF CONTRACT

The General Conditions of Contract for Construction Works Third Edition (2015), published by the South African Institution of Civil Engineering, is applicable to this Contract.

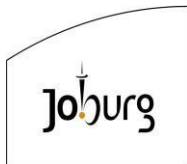
Copies of these conditions of contract may be obtained from the South African Institution of Civil Engineering (Telephone number: 011-805 5947)

C1.2.1.1 Contract Specific Data

The following contract specific data are applicable to this Contract:

GCC Clause	Information
1.1.1.13	The Defects Liability Period is 52 weeks from the date of the Certificate of Completion.
1.1.1.14	Delete clause 1.1.1.14 and replace with: “Due Completion Date” means the date of expiry of the time stated in the Contract Data for achieving Practical Completion of the Works, calculated from the date on which the Employer’s Agent instructs the commencement of Works and adjusted by such extensions of time or acceleration as may be allowed in terms of the Contract.” The time for achieving Practical Completion is 24 months, inclusive of non working and special non-working days.
1. 1.1.15	The name of the Employer is Johannesburg Water (SOC) Limited Contact person is Mr Thapelo Teane
1.1.1.16	The name of the Employer’s Agent is Knight Piesold Consulting represented by Rhyno Nel, who is Registered as a PrEng with the Engineering Council of South Africa.
1.1.1.26	The Pricing Strategy is a Re-measurement Contract.
1.2.1.2	The address of the Employer is: Physical Turbine Hall 65 Ntemi Piliso Street Newtown Postal P.O. Box 61542 Marshalltown 2107 Tel: 011 688 6615 Fax: 011 688 1521 Email: Thapelo.teane@jwater.co.za
1.2.1.2	The address of the Employer’s Agent is TBA after Contract Award
3.2.3	Specific Approval – The Employer’s Agent is required to obtain the Employer’s approval for the following: Approval of Variation Orders

Employer:		Contractor:	
Witness:		Witness:	



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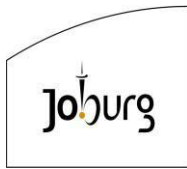


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GCC Clause	Information
	• The use of contingencies • Approval of Prov. Sum (3 Quotes system) • Approval to exceed the Contract Sum • Approval of Subcontracting Plan and work package breakdown • Stoppage/ suspension of works
4.4.2	Add the following after this clause: Apart from sub-contractors identified by the Contractor for the execution of certain sections of the Works, subcontractors shall also include SMME's (Small Medium and Micro Enterprises), who are identified from the Local Community for the execution of certain sections of the Works. The appointment of subcontractors and the allocation of work to subcontractors shall, in addition to the provisions of the General Conditions of Contract, comply with, but not be limited to, the provisions of C1.2.1.2.14 (see below). A minimum value of 10% of the Contract Price shall be subcontracted to SMME's. Where the advised items for subcontracting do not form 10% of the Contract Price, the Contractor shall identify additional works that will be subcontracted to ensure compliance with the minimum subcontracting percentage.
4.10.1	Add the following to this clause: The Contractor shall employ labour from Local Communities (otherwise known as Local Labour), in accordance with the Tender Data, Scope of Work, Site Information, and Specifications. All Local Labour shall be recruited through the Community Liaison Officer (CLO) and/or Labour Desk Officer (LDO). The Contractor remains fully responsible for all Local Labour that are employed for the execution of the Works, as if they were the Contractor's own labour.
4.11.1	Add the following to this clause: Competent Employees shall include, amongst others, the following Key Personnel: • Contracts Manager • Site Agent • Safety Officer The minimum requirements in terms of qualifications and experience of these Key Personnel are listed in C1.2.1.2.15 (see below).

Employer:		Contractor:	
Witness:		Witness:	



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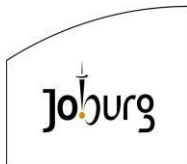


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GCC Clause	Information
5.3.1	The documentation required before commencement with Works execution are: • Approved Health and Safety File (Clause 4.3) • Approval of the Environmental File (Clause 4.3) • Initial programme & cashflow projections (Clause 5.6) • Guarantee from Bank or Insurance Company (Clause 6.2) • Insurance of the Works, Plant, etc. (Clause 8.6), including but not limited to: ○ SASRIA Policy ○ Liability Insurance ○ Insurance of Construction Machinery and Plant ○ Insurance of Motor Vehicle Liability, etc. • Compliance Certificate in respect of COID • Signed Notification to the Department of Labour • Construction Permit (where applicable). The Employer will require Health and Safety documentation from the Contractor to acquire this permit. • Organogram of resources • Delegation of Authority (on company letterhead) • Subcontract plan / proposal which includes a number of Subcontractors that meet requirements as per conditions of C1.2.1.2.14
5.3.2	The time to submit the documentation required before Commencement of the Works is 28 days.
5.3.3	Time to instruct commencement of the Works Delete Clause 5.3.3 and replace with the following: The Contractor shall commence with carrying out the Works upon written instruction from the Employer's Agent to commence with the Works.
5.4.2	The Works will be executed on an operational Wastewater Treatment Works. The Treatment Works shall remain operational at all times, except when written permission is granted by the Employer's Agent for any interruption or shutdown. All such interruptions/shutdowns shall be included in the Contractor's Programme.
5.8.1	Working days shall be Monday to Friday, between 07h00 to 17h00.
5.8.1	The non-working days are Saturdays and Sundays. The special non-working days are all Public Holidays in terms of the Public Holidays Act (as amended), and the annual "Builder's Break" as defined by SAFCEC on an annual basis but to be included in the contract duration
5.11.1.2	Notwithstanding any other provision ionof this Contract, the Contractor agrees that there shall be no suspension of the Works due to non-payment by the Employer. The Contractor shall continue to perform the Works as scheduled,

Employer:		Contractor:	
Witness:		Witness:	



CONTRACT: JW13897
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EXPANSION OF CAPACITY UNIT 5 – INSTALLATION OF
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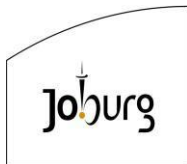


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GCC Clause	Information
	regardless of any delays or failures by the Employer to make payments when due.
5.13.1	The penalty for failing to complete the Works is the greater of: An amount equal to the daily Time Related P&G rate (as calculated from the Time Related P&G section in the Bill of Quantities) or R50,000.00 per day, whichever is greater.
5.14.1	The requirements for achieving Practical Completion are: • Installation, testing & commissioning and 3 Month Trial Operation of all equipment as per scope of work.
5.16.3	The latent defects period is 10 years for Civil Engineering works, Five (5) years for Building Works, Three (3) years for Electrical, Control and Instrumentation engineering works and Five (5) years for Mechanical engineering works.
6.2.1	The time to deliver the Form of Guarantee is within 28 days from the Commencement Date. The security to be provided by the Contractor shall be in the form of a On-demand Performance Guarantee and will comply with the requirements of Clause 6.2.3. The value of the Performance Guarantee shall be ten (10)% of the Contract Sum, which sum excludes VAT.
6.8.2	The Contract Price Adjustment is applicable for this contract. The contract rates shall be adjusted by the change in CPA (as published by Statistics SA). The following formula will be applicable. $(1-x) \left[\frac{aLt}{Lo} + \frac{bPt}{Po} + \frac{cMt}{Mo} + \frac{dFt}{Fo} - 1 \right]$ In which the symbols have the following meaning as per GCC 2015: "x" is the proportion of "Ac" which is not subject to adjustment. "a", "b", "c" and "d" are the coefficients contained in the Contract Data, which are deemed, irrespective of the actual constituents of the work, to represent the proportionate value of labour, contractors' equipment, material (other than "special materials" specified in the Contract Data) and fuel respectively. "L" is the "Labour Index" "P" is the "Plant Index" "M" is the "Materials Index" "F" is the "Fuel Index" The suffix "o" denotes the base indices applicable to the base month as stated in the Contract Data.

Employer:		Contractor:	
Witness:		Witness:	



CONTRACT: JW13897

**NORTHERN WASTEWATER TREATMENT WORKS
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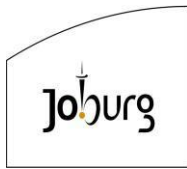


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GCC Clause	Information
	The suffix "t" denotes the current indices applicable to the month in which the last day of the period falls to which the relevant monthly statement relates. If any index relevant to any particular certificate is not known at the time when the certificate is prepared, the Engineer shall estimate the value of such index. Any correction which may be necessary when the correct indices become known, shall be made by the Engineer in subsequent payment certificates. The value of the payment certificates issued shall be adjusted in accordance with the Contract Price Adjustment Schedule, with the following values: The value of "x" is 0,10 The values of the coefficients are: a = 0,32 Labour b = 0,25 Contractor's equipment c = 0,33 Material d = 0,10 Fuel The province where the Site is located is Gauteng and the urban area where the project is implemented is Johannesburg. The base month is the month prior to the month in which the tender closes. The Consumer Price Indices for Labour (L), Plant (P), Material (M) and Fuel (F) are as published by Statistics South Africa for the applicable time.
6.8.3	Price adjustments for variations in the costs of special materials are NOT allowed.
6.10.1.5	The percentage advance on materials not yet built into the Permanent Works is 80%.
6.10.3	The percentage retention on the amounts due to the Contractor is 10%. The limit of retention money is 5% of the Contract Price. These Amounts will be kept in an Interest Free account.
6.10.4	Delivery, dissatisfaction with and payment of payment certificates Delete Clause 6.10.4 and replace with the following: Payment shall be made upon: • The Contractor providing a payment certificate with all required supporting documents to the Employer's Agent on 20th of the month. • The payment certificate being submitted with an original tax invoice. • A statement being submitted on the last day of the month. Payment will be made within 30 days of receipt of the Contractor's statement. Payment shall be subject to the Contractor submitting an Original Tax Invoice compliant with SARS requirements for a Valid Tax Invoice to the Employer for the amount due. Any dissatisfaction in respect of such payment certificate shall be dealt with in terms of Clause 10.2.

Employer:		Contractor:	
Witness:		Witness:	



CONTRACT: JW13897

**NORTHERN WASTEWATER TREATMENT WORKS
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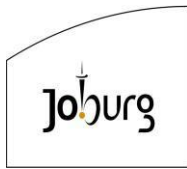


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GCC Clause	Information
6.10.5	Payment of Retention Money Add to Clause 6.10.5 the following: Payment will be subject to Johannesburg Water processes as outlined in clause 6.10.4 as amended.
6.10.6.2	Delete Clause 6.10.6.2
6.11	Delete Clause 6.11
7.8.2	Cost of making good of defects Amend Clause 7.8.2.1 as follows: In the first line, correct the spelling of 'therefore'.
8.1.1	Add to the end of Clause 8.1.1 the following text: "Although the extent of the Works and the Site are located within the boundaries of the Olifantsvlei Wastewater Treatment Works, and the Employer may (or may not) provide security for the Treatment Works as a whole, the Contractor shall remain solely responsible for the protection of the Works and the Site".
8.4.1.1	Add to the end of Clause 8.4.1.1 the following text: "indemnifies the Employer against any liability in respect of damage or physical loss of property of any person or injury or death of any person due to non-compliance with the Occupational Health and Safety Act (Act 85 of 1993).
8.6	Add the following clause to 8.6 "In addition to any statutory obligations, or other requirements contained in the Conditions of Contract or in the Insurance Policy and Documents the Contractor shall report in writing to the Employer's Agent every accident within 48 hours of its occurrence, whether such accident is in respect of damage to persons or property. The report shall contain full details of the accident. The Employer's Agent shall have the right to make all and any enquiries either on the Site or elsewhere as to the cause and results of any such accident and the Contractor shall give the Employer's Agent full access and facilities for carrying out such enquiries. The Employer's Agent shall be given full and immediate access to all communication, reports, findings, assessments, etc. between the Contractor and its Insurance Broker (or Insurance Provider), particularly as it relates to the processing and outcomes of any and all claims. The Contractor shall further allow and authorise the Employer's Agent to communicate with its Insurance Broker (or Insurance Provider) to obtain any and all such information as the Employer's Agent deems necessary."
8.6.1.1.2	The value of plant and materials supplied by the Employer to be included in the insurance sum is R0.
8.6.1.1.3	The amount to cover professional fees for repairing damage and loss to be included in the insurance sum is an amount equal to 15% of the Contract Price.

Employer:		Contractor:	
Witness:		Witness:	



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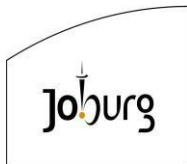


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GCC Clause	Information
8.6.1.2	Delete clause 8.6.1.2 and replace with the following: “Following the introduction of legislation affecting the articles of the South African Special Risks Insurance Association (SASRIA), insurance cover for loss or damage to the Works caused by any event defined as a risk in terms of the insurance offered by SASRIA, will be provided under a certificate issued by SASRIA.”
8.6.1.3	The limit of indemnity for liability insurance is R20,000,000 (Twenty million Rand) for any single claim – the number of claims to be unlimited during the Construction and Defects Liability Periods
8.6.1.5	In addition to the insurances required in terms of General Conditions of Contract for Construction Works 2015 Clauses 8.6.1.1 to 8.6.1.4 the following insurance is also required: a. The Contractor shall insure all Construction Machinery and Plant (including tools, offices and other temporary structures and content) and other items, other than those intended for incorporation into the works, owned, leased or hired and brought on to the Site against all risks of physical loss or damage for the period that such Plant shall be on the Site to the full value thereof. In respect of Machinery and Plant brought on to the Site by or on behalf of Sub-Contractors, the Contractor shall be deemed to have complied with the provisions of this Sub-Clause if it has ensured that such Sub-Contractors have similarly insured such Plant and Machinery. Such insurance shall be affected with an Insurer and in terms approved by the Employer (which approval shall not be unreasonably withheld) and the Contractor shall, when required, submit to the Employer's Insurance Brokers, via the Employer's Agent, the policy or policies of insurance and receipts for payment of the current premiums. b. The Contractor and the Sub-contractors shall affect and maintain at their cost, insurance under the provision of the Compensation for Occupational Injuries and Diseases Act (COID), 1993 (Act No. 130 of 1993) c. The Contractor and the Sub-Contractors shall affect and maintain at their own cost, motor vehicle liability insurance with at least indemnification for “balance of third party” risks, including passenger liability with a limit of indemnity of not less than R2,5 million. d. Where the contract involves manufacturing and/or fabrication of the works or part thereof at premises other than the Site, the Contractor shall satisfy the Employer that all materials and equipment for incorporation in the works are adequately insured during manufacture and/or fabrication. In the event of the Employer having an insurable interest in such works during manufacture or fabrication then such interest shall be noted by endorsement to the Contractor's Policies of Insurance. e. Any other Insurance cover that may be deemed necessary by the Contractor to ensure full and successful completion of the Works.
10.4.2	Dispute resolution shall be by Amicable Settlement, failing which, any dispute shall be resolved by way of ad-hoc Adjudication.

Employer:		Contractor:	
Witness:		Witness:	



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GCC Clause	Information
10.5.3	The number of Adjudication Board Members to be appointed is one (1).
10.7.1	The determination of disputes shall be by arbitration.

C1.2.1.2 Additions

The additional Conditions of Contract are:

C1.2.1.2.1 Penalties

In addition to GCC clause 5.13, during the Contract Period should the Contractor:

a) Fail to report

- The Employer shall levy a penalty on Contractor, should the latter fail to provide reporting as required in C1.2.1.2.6, C1.2.1.2.14 and the specification highlighted in the Scope of Work, with regard to content and frequency, whilst as per the Pricing Data section no payment for work completed shall be processed.
- The penalty value shall be R5,000.00 per report per occasion; and
- If the Contractor fails to complete the aforementioned more than three incidents and should the Employer or his duly authorised representative find that the Contractor is hindering his (the Employer's) deliverables to JW Senior Management, he shall reserve the right to:
 - i. perform the Works internally or through another Contractor; and
 - ii. deduct additional costs incurred by the Employer from monies owed to the Contractor or from the Contractor's Guarantee. Additional costs incurred by the Employer shall include all claims from Contract affected parties, claims such as but not be limited to claims from customers, any costs associated with the loss of water, and all costs associated with the procurement of an alternative Contractor.
 - iii. terminate the Contract.

No liability in terms of this clause shall be attached to the Contractor if he can prove to the satisfaction of the Employer that the nature of the failure is due to fire, war, riot, strikes, act of God, lockout, accident or other unforeseen occurrences or circumstances beyond the Contractor's control, provided, however, that in all cases the Contractor has notified the Employer in writing within 24 hours of it first coming to his notice, that delivery shall be delayed or become impossible for the above-mentioned reasons.

b) Fail to pay any labourer or SMME

- The Employer shall levy a penalty on the Contractor, should the latter fail to provide payment to any labourer or SMME as required in the specification highlighted in the Scope of Work and specified in the appointment agreements with the Contractor and the labourer or SMME.

Employer:		Contractor:	
Witness:		Witness:	



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- The penalty value shall be R 50,000.00 per incident per occasion; and
- If the Contractor fails to complete the aforementioned more than three incidents and should the Employer or his duly authorised representative find that the Contractor is hindering his (the Employer's) deliverables to JW Senior Management, he shall reserve the right to:
 - i. perform the Works internally or through another Contractor; and
 - ii. deduct additional costs incurred by the Employer from monies owed to the Contractor or from the Contractor's Guarantee. Additional costs incurred by the Employer shall include all claims from Contract affected parties, claims such as but not be limited to claims from customers, any costs associated with the loss of water, and all costs associated with the procurement of an alternative Contractor.
 - iii. terminate the Contract.

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c) Failure to meet target participation by local SMME

If the Contractor fails to achieve the monetary value of the target set by the Employer for contract participation by local SMME Contractors in terms of **C1.2.1.2.14**, the Contractor shall be liable to the Employer for a sum calculated in accordance with the Contract Data and the aforementioned Scope as a penalty for such underachievement.

The penalty for failing to achieve the monetary value of the target set by the Employer for contract participation by Targeted Enterprises and local SMME Contractors in terms of the Scope of Works is 50% of the monetary value by which the achieved monetary value falls short of the target monetary value.

d) Failure to meet the occupational health and safety compliance target

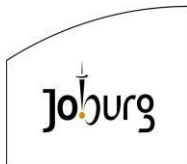
Monthly compliance rating will be calculated for each Contractor as per a formula determined by the Employer focusing on or incorporating outcomes of assurance (e.g. monthly audit), operational (e.g. behavioral based safety inspection) assessments and other requirements, as necessary.

The Employer will impose a penalty value of R20 000,00 per audit report where a Contractor scores below 85%.

The Employer will impose a penalty value of R2 000,00 per occasion where the Contractor scores above 85% but below 93% for two successive months.

e) Failure to meet the Environmental compliance target

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Witness:		Witness:	



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The Employer will impose a penalty value of R20 000,00 per audit report where a Contractor scores below 85%.

The Employer will impose a penalty value of R2 000,00 per occasion where the Contractor scores above 85% but below 93% for two successive months.

f) Penalties payable

If penalties are payable, they will be processed through a credit note issued by the Contractor.

g) Penalties irreversible

The Contractor shall note that all penalties once imposed shall be non-recoverable or non-reversible, even if the default is remedied.

C1.2.1.2.2 Source of Instructions

The Contractor shall neither seek nor accept instructions from any authority external to the Employer's Agent in connection with the performance of his services under this Contract. The Contractor shall refrain from any action which may adversely affect the Employer and shall fulfill his commitments with fullest regard for the interest of the Employer. The Contractor may only accept and comply with instructions from the Employer's Health and Safety Representative or the Employer's Environmental Representative with regards to matters regarding Health & Safety or Environmental Management respectively, but with further approval from the Employer's Agent.

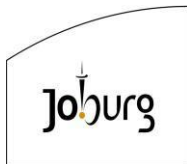
C1.2.1.2.3 Officials not to Benefit

The Contractor warrants that no official of the Employer has been or shall be admitted by the Contractor to any direct or indirect benefit arising from this Contract or the award thereof. The Contractor agrees that breach of this provision is a breach of the Contract.

C1.2.1.2.4 Prevention of Corruption

The Employer shall be entitled to cancel the Contract and to recover from the Contractor the amount of any loss resulting from such cancellation, if the Contractor has offered or given any person any gift or consideration of any kind as an inducement or reward for doing or intending to do any action in relation to the obtaining or the execution of the Contract or any other contract with the Employer or for showing or intending to show favor or disfavor to any person in relation to the Contract or any other contract with the Employer. If similar acts have been done by any persons employed by the Contractor or acting on his behalf whether with or without the knowledge of the Contractor in relation to this or any other Contract with the Employer, the same consequences shall apply.

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Witness:		Witness:	



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C1.2.1.2.5 Confidential Nature of Documents

All maps, drawings, photographs, mosaics, plans, reports, recommendations, estimates, documents and all other data compiled by or received by the Contractor under the Contract shall be the property of the Employer, shall be treated as confidential and shall be delivered only to the Employer's Agent or his duly authorized representative on completion of the Works; their contents shall not be made known by the Contractor to any person other than the personnel of the Contractor performing services under this Contract without the prior written consent of the Employer.

C1.2.1.2.6 Returns of Labour, SMME, Plant, Equipment and Material

The Contractor shall provide a return in detail in the form and at such intervals as the Employer's Agent or his duly authorized representative may prescribe showing the supervisory staff and the numbers of the several classes of labour from time to time employed by the Contractor on the Site and such information respecting construction plant, equipment and material as the Employer's Agent or his duly authorized representative may require. The supporting documents required for SMMEs include but are not limited to the following:

- A completed and signed sub-contracting agreement between the Contractor and the SMME
- Valid CIPC registration (i.e. CK, COR)
- SA ID copies of owners
- Active CIDB membership: minimum grading 1CE
- Valid CSD compliance status
- Valid EME affidavit
- COIDA certificate
- Company Profile including similar experience and skilled personnel CVs
- Health and Safety Plan
- Proof of Payments

The supporting documents required for local labourers include but are not limited to the following

- A completed and signed employment contract between the Contractor and labourer
- Certified Copies of IDs
- Monthly Individual proof of payment
- Monthly timesheets
- Training returns
- UIF forms (proof of registration from Labour)

C1.2.1.2.7 Materials and Workmanship

All materials and workmanship shall be of the respective kinds described in the Contract and in accordance with the Employer's Agent's instructions and shall be subjected from time to time to such tests as the Employer's Agent may direct at the place of manufacture

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or fabrication, or on the Site or at all or any of such places. The Contractor shall provide such assistance, instruments, machines, labour and materials as are normally required for examining, measuring and testing any work and the quality, weight or quantity of any materials used and shall supply samples of materials before incorporation in the Works for testing as may be selected and required by the Employer's Agent. All testing equipment and instruments provided by the Contractor shall be used only by the Employer's Agent or by the Contractor in accordance with the instructions of the Employer's Agent.

- a) No material not conforming with the Specifications in the Contract shall be used for the Works without prior written approval of the Employer and instruction of the Employer's Agent, provided always that if the use of such material results or may result in increasing the Contract Price, the procedure in GCC clause 6.3 (Variations) shall apply.

C1.2.1.2.8 Examination of the Work before Covering Up

No work shall be covered up or put out of view without the approval of the Employer's Agent or his duly authorized representative and the Contractor shall afford full opportunity for the Employer's Agent or his duly authorized representative to examine and measure any work which is about to be covered up or put out of view and to examine foundations before permanent work is placed thereon. The Contractor shall give due notice to the Employer's Agent whenever any such work or foundations is or are ready or about to be ready for examination. The Employer's Agent or his duly authorized representative shall without unreasonable delay, unless he considers it unnecessary and advises the Contractor accordingly, attend for the purpose of examining and measuring such work or of examining such foundations.

C1.2.1.2.9 Employer's Agent's Power to Order Removal of Improper Work and Materials

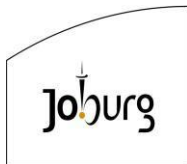
The Employer's Agent or his duly authorized representative shall during the progress of the Works have power to order in writing from time to time, and the Contractor shall execute at his cost and expense, the following operations:

- a) removal from the Site within such time or times as may be specified in the order of any materials which in the opinion of the Employer's Agent are not in accordance with the Contract.
- b) substitution of proper and suitable materials; and
- c) removal and proper re-execution (notwithstanding any previous test thereof or interim payment therefore) of any work which in respect of materials or workmanship is not in the opinion of the Employer's Agent or his duly authorized representative in accordance with the Contract.

C1.2.1.2.10 Default of Contractor in carrying out Employer's Agent's or his Duly Authorized Representative's Instructions

In case of default on the part of the Contractor in carrying out an instruction of the Employer's Agent or his duly authorized representative, the Employer shall be entitled to employ and pay other persons to carry out the same, and all expenses consequent thereon or incidental thereto shall be borne by the Contractor and shall be recoverable from him by the Employer and may be deducted by the Employer from any monies due or which may become due to the Contractor.

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Witness:		Witness:	



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C1.2.1.2.11 Date Falling on Public Holiday or Weekend

Where under the terms of the Contract any act is to be done or any period is to expire upon a certain day and that day or that period fall on a day of rest or recognized public holiday or weekend, the Contract shall have effect as if the act were to be done or the period to expire upon the working day following such day.

C1.2.1.2.12 Ambiguities and Inconsistencies

The Employer or the Contractor shall notify the other as soon as either becomes aware of an ambiguity or inconsistency in or between the documents, which are part of this Contract. Governed by the spirit and intention of the Contract, the Employer shall give a binding instruction resolving the ambiguity or inconsistency.

C1.2.1.2.13 False Claims by the Contractor

- a. Failure, by the Contractor, to demonstrate or present any feature declared during the procurement stage shall constitute grounds for Contract termination or the market related equivalent price discount, if no market related value is available, the Employer shall give a final ruling on the amount. This shall be at the discretion of the Employer based on the implication of such omission. Should the Contractor refuse to accept the Employer's price, the Contract shall be terminated.
- b. Any false claims by the Contractor or his staff (with or without his knowledge), based on Works to be performed or completed per site stage shall constitute grounds for Contract termination and result in blacklisting on the Employer's database.

The Contractor shall note that any of the above shall constitute non-performance on the part of the Contractor, further resulting in him forfeiting his full Contract Guarantee.

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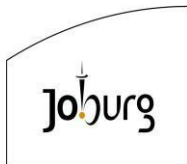
C1.2.1.2.14 Special Conditions

The successful Contractor must subcontract a minimum of 10% of the value of this Contract to an entity(s) described below. The value of the Contract for the purposes of this calculation shall be equal to the Contract Price (excluding VAT) as described in the General Conditions of Contract.

The subcontractor/s chosen for this purpose must be registered on National Treasury's Central Supplier Database (CSD) and must be from one of the following designated groups:

- An EME or QSE which is at least 51% owned by black people;
 - An EME or QSE which is at least 51% owned by black people who are youth;
 - An EME or QSE which is at least 51% owned by black women;
 - An EME or QSE which is at least 51% owned by black people with disabilities;
 - An EME or QSE which is 51% owned by black people living in rural or underdeveloped areas or townships;
 - A cooperative which is at least 51% owned by black people;
 - An EME or QSE which is at least 51% owned by black people who are military veterans;
 - an EME or QSE .
1. Subcontractors must be chosen from National Treasury's Central Supplier Database which can be accessed on National Treasury's website.
 2. The Contractor will identify subcontracting items or tasks that will meet the subcontracting minimum of 10% of the value of this Contract. In complying with this condition, the following shall be adhered with:
 - The Contractor shall develop a Subcontracting Plan that sets out the details of the proposed Subcontracting arrangements including, but not limited to, competitive bidding process to be used for the appointment of SMME's, scope of work to be allocated, criteria for the selection of Subcontractor(s), Subcontractor agreements, cost of the work to be Subcontracted, etc.
 - The Subcontracting Plan shall be issued to the Employer's Agent for approval, prior to the engagement of any Subcontractor(s) by the Contractor. The activities, time periods, linkages, etc. associated with the development and approval of the Subcontracting Plan shall be included in the Project Programme, which Programme is subject to the approval of the Employer's Agent.
 - The Employers Agent may assist with identified items for subcontracting but where these do not form 10% of the Contract Price, the Contractor shall identify additional works that will be subcontracted to ensure compliance with the minimum subcontracting percentage.

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Witness:		Witness:	



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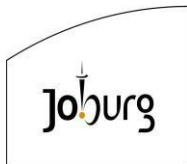


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- In the event that a rate supplied by the Contractor for a specific BoQ work item is not sufficient to cover Subcontractor costs/rates for that specific item, the Contractor shall provide a detailed rate breakdown for that specific BoQ item (and each and every subsequent BoQ work item where the rate is not sufficient to cover Subcontractor cost); and shall indicate costs (amongst others) for labour, material, handling, mark-ups, etc. to prove that the rate that was submitted during tender stage was in fact market related; and in balance with other rates that were submitted for work items that will not be undertaken by Subcontractors.
 - Should any delays be experienced during the period of the Contract due to the appointment of subcontractors by the Contractor, work stoppages by subcontractors, industrial action by subcontractors, etc. such delays shall be assigned to the Contractor, and no claims for Extension of Time will be entertained by the Employer.
 - The Contractor will be liable to pay a penalty if the Subcontracting target of 10% has not been met by the end of the Contract. The Employer will deduct this penalty amount through the Payment Certificate process. The Employer will have full discretion as to when the penalty will be applied (i.e. the month in which the penalty amount will be deducted). In calculating the total amount that has been (will be) paid to SMME's, all amounts that have actually been reimbursed to SMME's will be taken into account including P&G's, amounts for actual work done, etc.
 - The penalty amount described above shall be equal to 50% (fifty percent) of the difference between the target Subcontract amount (i.e 10% of the Contract Price) and the actual amount that has been spent on Subcontractors/SMME's by the end of the Contract.
3. A Subcontracting agreement between the Main Contractor and the Subcontractor shall be submitted to JW upon appointment and must include the following minimum information:
- Name of Subcontractor and BBBEE status
 - Subcontractor domicilium and registered address of business, as well as status of compliance with all applicable legal requirements.
 - Area and location of project
 - Scope of Work issued to the Subcontractor
 - Value of the Work issued including P&G's (this information must be submitted in a format that is readily auditable).
 - Assistance provided/to be provided to the Subcontractor by the Contractor, e.g. acquisition of materials, machinery, tools, etc.
 - Indicate the remuneration rate of all local labourers (the latest Gazetted labour rates)

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Witness:		Witness:	



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- A Skills Transfer Plan which will indicate, amongst others, the proposed skills that will be transferred to the Subcontractor, individuals that will be identified for skills transfer, the amount that will be spent by the Contractor on skills transfer, evidence that will be produced by the Contractor (such as training certificates, training registers, etc.), etc.
 - A specific provision that enables the Contractor to pay the Subcontractor's suppliers, labour (skilled, local, etc.) or any other service provider of the Subcontractor, should the Subcontractor fail to do so. This provision shall include (but not be limited to) the following conditions/proviso's: Invoices that are due for payment from suppliers and the like must be invoices that have been approved for payment and be based on work or services that have actually been completed or delivered. Payments that are due to labour will be based on approved timesheets.
 - The Contractor is to ensure that any invoice presented for payment is indeed an approved invoice, and that the necessary work or services have been delivered or completed. The approved invoice shall be settled (paid) by the Contractor (on behalf of the Subcontractor) by the due date for payment.
 - The Contractor will be entitled to deduct payments made to any third party, on behalf of the Subcontractor, from subsequent payments that may become due to the Subcontractor.
 - The Contractor will be entitled to bill the Subcontractor a mark-up on the payments made on behalf of the sub-contractor. The mark-up shall not be more than 10% (ten percent) of the amount actually paid (i.e. the amount (excluding VAT) reflected on the invoice that has been settled). The mark-up amount shall be deducted from subsequent payments that may become due to the Subcontractor.
 - Proof of any such payments made on behalf of the Subcontractor shall be issued to the Employer's Agent, on request, with all necessary supporting information that the Employer's Agent may request
 - Payments made on behalf of the Subcontractor are not subject to the Contractor first being paid by the Employer. Therefore, the Contractor shall pay approved invoices, on behalf of the Subcontractor, irrespective of whether the Contractor has first been paid by the Employer. The Contractor will be entitled to levy interest on all payments that have been made in this regard, in accordance with the necessary interest payment provisions contained in the General and Special Conditions of Contract.
4. The successful Contractor shall submit periodic SMME/Subcontractor reports to the Employer's Agent as follows:
- Status of progress against the Subcontracting Plan (described above), to the approval of the Employer's Agent
 - Subcontractor domicilium and registered address of business, as well as ongoing status of compliance with all applicable legal requirements.
 - Name of Subcontractor and BBBEE status

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Witness:		Witness:	



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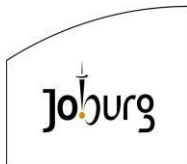
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- Area and location of project
 - Scope of work issued to the Subcontractor
 - Value of the work issued (this information must be submitted in a format that is readily auditable)
 - Monthly payments made to the subcontractor (this information must be submitted in a format that is readily auditable)
 - Assistance provided to the Subcontractor e.g. advance payments, acquisition of materials, machinery, tools, etc.
 - Performance of the Subcontractor, with evidence to support this performance assessment.
5. Upon completion of the project, the Contractor is required to provide a final report to JW on skills transferred to / acquired by the Subcontractor(s) engaged on the Project, description and value of work performed, as well as their overall performance.
6. The Contractor shall also indicate whether the experience gained by the Subcontractor is sufficient to assist the Subcontractor to improve their CIDB grading, with full details of supporting information.

C1.2.1.2.15 Competent Employees

Competent Employees	Qualifications	Experience
Contracts Manager	Qualifications of Contracts Manager: - Bachelor's degree (Civil or Mechanical or Electrical Engineering) OR - Quantity Surveying / Construction Management equivalent or higher. AND - Professional Registration (Pr. Eng. / Pr. Tech.Eng) OR PrCPM / PrCM/ PrQS	Minimum of two (2), or more completed Mechanical, Electrical or Civil wastewater or potable water treatment projects with a minimum value of R80mil as Contracts Manager
Site Manager / Site Agent	Qualifications of Site Agent: National Diploma (Mech/Elec) Engineering or more; AND Registered as a Candidate Professional or more will be considered.	Minimum of two (2), or more completed Mechanical or Electrical wastewater or potable water treatment project with a minimum value of R80mil as Site Agent/ Site Manager
Safety Officer	Qualifications of Safety Officer National Diploma (Safety Management)/National Diploma (Environmental Health/Environmental Science/ Environmental Management)	Minimum of two (2), or more completed Mechanical, Electrical or Civil Projects Completed as Safety Officer

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Witness:		Witness:	



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	/SAMTRAC / SHEOMTRAC/ SHEMTRAC / MESHTRAC /NEBOSH / Safety Officers Course (NQF 5) or more, AND Professional Registration with SACPCMP in the Construction Health and Safety Sector.	

C1.2.1.2.16 Tie-in Limitations

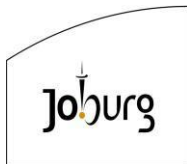
The connection of new infrastructure to the existing infrastructure is limited to low-flow periods and subject to prior arrangement and approval by the Works.

C1.2.1.3 Variations to General Conditions of Contract

Add the following Table:

3.2.4	Employer's Agent for Health and Safety Replace Clause 3.2.4 with the following: 'In terms of Clause 1.3.2, all parties to the Contract shall be subject to the relevant requirements of the Construction Regulations 2014 (as amended) of the Occupational Health and Safety Act, Act 85 of 1993 (as amended).' Add the following at the end of the above new replacement Clause 3.2.4: 'Where the Employer is obliged to appoint an Employer's Agent for Health and Safety in terms of the Construction Regulations 2014 (as amended) of the Occupational Health and Safety Act (Act 85 of 1993 as amended), and where such Employer's Agent for Health and Safety has complied with the registration requirements of a Construction Health and Safety Agent as a specified category in terms of section 18 (1) (c) of the Project and Construction Management Professions Act (Act 48 of 2000), the applicable clauses of the latest edition of the "Standard Scope of Services for Construction Health and Safety Agents Registered In Terms Of Section 18(1)(c) of the Project And Construction Management Professions Act (Act No. 48 Of 2000)", including Clauses 2.2.5 "STAGE 5 - CONSTRUCTION DOCUMENTATION AND MANAGEMENT", and 2.2.6 "STAGE 6 - PROJECT CLOSE – OUT", and 2.2.7 "ADDITIONAL RELATED SERVICES", as published in "Registration Rules for Construction Health and Safety Agents in Terms of Section 18 (1) (c) of the Project and Construction Management Professions Act, 2000 (Act No. 48 of 2000)" by the South African Council for Construction and Project Management Professionals in terms of the Project and Construction Management Professions Act (Act 48 of 2000 as amended), shall also apply.'
5.1.1.2	Time Calculations

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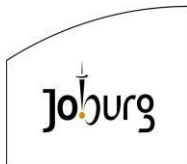


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	SEPARATE THE PHRASE “shall be excluded from the calculation of the time-span concerned.” BY MOVING IT ONTO A NEW LINE AS A NEW PARAGRAPH, AND PROMOTE THAT PARAGRAPH BY ONE PARAGRAPH LEVEL TO A POSITION WHERE IT FORMS THE LAST PART OF SUB-CLAUSE 5.1.1, SO THAT SUB-CLAUSE 5.1.1.2 READS AS FOLLOWS: 5.1.1.2 The day on which the timespan commences shall be excluded from the calculation of the timespan concerned.”
5.7.1	Rate of progress ON PAGE 25, IN THE TOP PARAGRAPH, FOR THE SENTENCE COMMENCING WITH “Such steps shall...” REPLACE THE SENTENCE “Such steps shall be approved by the Employer's Agent, which approval shall not be unreasonably withheld.” WITH “Such steps shall be subject to the approval of the Employer's Agent, which approval shall not be unreasonably withheld.”
6.5.1.3	Basis of payment for dayworks ON PAGE 40, IN THE LAST LINE OF THE SUB-CLAUSE, REPLACE THE PHRASE “ruling plant hire rates” WITH “ruling construction equipment hire rates”

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C1.2.2 Part 2: Data Provided by the Contractor

GCC Clause	Information																
Clause 1.1.9	The name of the Contractor is..... The Contact person is.....																
Clause 1.2.1.2	The address of the Contractor is:<table border="1" style="width: 100%;"><thead><tr><th>Physical Address:</th><th>Postal Address:</th></tr></thead><tbody><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td>Tel:</td><td>Fax:</td></tr><tr><td> </td><td> </td></tr><tr><td>Email</td><td> </td></tr></tbody></table>	Physical Address:	Postal Address:									Tel:	Fax:			Email	
Physical Address:	Postal Address:																
Tel:	Fax:																
Email																	
Clause 6.2.1	The security to be provided by the Contractor shall be one of the following: The Performance Guarantee shall be irrevocable, On-Demand Performance Guarantee, to be issued exactly in the form of the proforma document provided in favour of the Employer by a Bank or Recognised Financial Institution or Cash in lieu of bond will apply.																
Clause 6.8.3	The variation in cost of special materials is <table style="width: 100%;"><thead><tr><th>Type</th><th>Unit</th><th>Rate</th></tr></thead><tbody><tr><td colspan="3" style="text-align: center;">NOT APPLICABLE</td></tr></tbody></table>	Type	Unit	Rate	NOT APPLICABLE												
Type	Unit	Rate															
NOT APPLICABLE																	

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW13897
Northern Wastewater Treatment Works
Expansion of Capacity Unit 5 – Installation of
Mechanical and Electrical Equipment



Volume 1 Tender and Contract

~~Section 01 Forms and Securities~~

Johannesburg Water (SOC) Ltd



Johannesburg Water

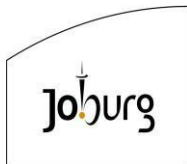
CONTRACT NO: JW13897

**EXPANSION OF CAPACITY UNIT 5 – INSTALLATION OF MECHANICAL
AND ELECTRICAL EQUIPMENT**

VOLUME 1

PART 1.3: FORMS AND SECURITIES

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW13897
Northern Wastewater Treatment Works
Expansion of Capacity Unit 5 – Installation of
Mechanical and Electrical Equipment



Volume 1 Tender and Contract
Section C1 Forms and Securities

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Employer:		Contractor:	
Witness:		Witness:	



Volume 1 Tender and Contract
Section C1 Forms and Securities

C1.3 FORMS AND SECURITIES

FORMS FOR COMPLETION BY THE CONTRACTOR

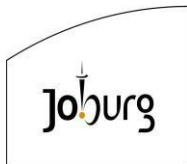
**THE FOLLOWING FORMS ARE TO BE COMPLETED BY THE CONTRACTOR AFTER
THE TENDER HAS BEEN AWARDED TO THE SUCCESSFUL TENDERER**

- a) Form of Guarantee
- b) Blasting Indemnity
- c) Agreement in terms of the Occupational Health and Safety Act
- d) Occupational Health And Safety Indemnity Undertaking

The forms will be completed by the Contractor who will be instructed to do so in the Form of Acceptance. The completed forms will become part of the Contract.

The Form of Guarantee is a pro forma document. The Contractor will provide an original document, from a financial institution, with the same text within the time stated in the Contract Data. Only a Bank or approved Insurance Company or Guarantee Corporation is acceptable as Guarantor.

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW13897
Northern Wastewater Treatment Works
Expansion of Capacity Unit 5 – Installation of
Mechanical and Electrical Equipment



Volume 1 Tender and Contract
Section C1 Forms and Securities

**TO BE PRINTED ON THE OFFICIAL LETTERHEAD OF THE GUARANTOR.
PERFORMANCE GUARANTEE**

For use with the General Conditions of Contract for Construction Works, ... Edition, ...

GUARANTEE REFERENCE NUMBER: [*]**

Whereas [insert the full name of the Employer], registration number: [insert registration number], of [insert full physical address] (the “Employer”) has awarded a contract for [insert a detailed description of the contract], under contract number: [insert details] (the “Contract”), to [insert full names of the Contractor], registration number [insert details], of [insert full physical address] (the “Contractor”).

And whereas the Contract requires the Contractor to provide to the Employer an on-demand performance guarantee for the due and proper performance by the Contractor of its obligations in terms of the Contract.

Now therefore:

[insert full names of the Guarantor], registration number [Insert details], of [insert the full physical address] (the “Guarantor”), duly represented by the undersigned: [insert the full names of the signatory], and [insert the full names of the signatory], acting herein in their respective capacities as: [insert full title] and [insert full title] respectively, of the Guarantor, and being duly authorized to sign this on demand performance guarantee (this “Guarantee”) and to incur obligations in relation thereto, in the name, and on behalf, of the Guarantor under, and in terms of, a Resolution of the Board of Directors or other written authority of the Guarantor, hereby irrevocably and unconditionally guarantees and undertakes:

1. To pay the Employer the sum or sums not exceeding the following aggregate amount: R [insert the amount] (the “Guaranteed Amount”) upon receipt of the documents identified in clauses 1.1 to 1.3 below
 - 1.1. A copy of a first written demand issued by the Employer to the Contractor stating that payment of a sum certified by the Engineer in an Interim or Final Payment Certificate has not been made in terms of the Contract and failing such payment within seven (7) calendar days, the Employer intends to call upon the Guarantor to make payment in terms of 1.2;
 - 1.2. A first written demand issued by the Employer to the Guarantor e-mailed to with a copy to the Contractor stating that a period of seven (7) days has elapsed since the first written demand in terms of 1.1 above and the sum certified has still not been paid;
 - 1.3. A copy of the aforesaid payment certificate which entitles the Employer to receive payment in terms of the Contract of the sum.
2. To pay to the Employer the Guaranteed Amount or the full outstanding balance upon receipt of a first written demand from the Employer to the Guarantor emailed to calling up this Performance Guarantee, such demand stating that:
 - 2.1. The Contract has been terminated due to the Contractor's default and that this Performance Guarantee is called up in terms of 2; or
 - 2.2. A provisional or final sequestration or liquidation court order has been granted against the Contractor and that the Performance Guarantee is called up in terms of 2; and

Employer:		Contractor:	
Witness:		Witness:	



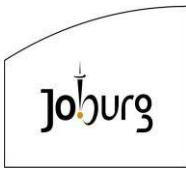
Contract: JW13897
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Section C1 Forms and Securities

- 2.3. The aforesaid written demand is accompanied by a copy of the notice of termination and/or the provisional/final sequestration and/or the provisional liquidation court order.
3. To pay to the Employer on demand any sum or sums not exceeding the Guaranteed Amount on presentation of a written demand signed by the Employer (the “**Demand**”), supported by a written statement signed by the Employer certifying that the Contractor, in the opinion of the Employer as at the date of issue of such Demand, is in breach of its obligations under the Contract or that a defect had occurred following the performance by the Contractor of its obligations under the Contract, and without being required to prove or set out the nature of any such breach or defect.
4. Payment by the Guarantor in terms of 1 to 3 shall be made within seven (7) calendar days upon receipt of the first written demand to the Guarantor.
5. The Guarantor hereby acknowledges that:
- 5.1. Any reference in this Performance Guarantee to the Contract is made for the purpose of convenience and shall not be construed as any intention whatsoever to create an accessory obligation or any intention whatsoever to create a suretyship;
- 5.2. Its obligation under this Performance Guarantee is restricted to the payment of money.
6. The Employer shall have the absolute right to arrange his affairs with the Contractor in any manner which the Employer may deem fit and the Guarantor shall not have the right to claim his release from this Performance Guarantee on account of any conduct alleged to be prejudicial to the Guarantor.
7. Neither the failure of the Employer to enforce strict or substantial compliance by the Contractor with its obligations under the Contract nor any act, conduct or omission by the Employer prejudicial to the interests of the Guarantor will discharge the Guarantor from liability under this Guarantee.
8. This Performance Guarantee, with the required demand notices in terms of 1 to 3, shall be regarded as a liquid document for the purpose of obtaining a court order.
9. This Performance Guarantee is neither negotiable nor transferable.
10. The Guarantor’s period of liability shall be from and including the date of issue of this Performance Guarantee and up to and including the date on which the Certificate of Completion of the Works has been issued or payment in full of the Guaranteed Sum, whichever occurs first. The Engineer and/or the Employer shall advise the Guarantor in writing of the date on which the Certificate of Completion of the Works has been issued.
11. The Guarantor chooses the physical address [**insert the full physical address**] care of [**insert the full names**], as well as the e-mail address....., for the service of all notices for all purposes in connection herewith.
12. This Guarantor is governed by the laws of the Republic of South Africa and any dispute arising hereunder shall be subject to the jurisdiction of the South African courts. In respect of such proceedings, each of the Parties specifically consents to the non-exclusive jurisdiction of the High Court of South Africa (Gauteng Local Division, Johannesburg).

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW13897
Northern Wastewater Treatment Works
Expansion of Capacity Unit 5 – Installation of
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Section C1 Forms and Securities

Signed at for and on behalf of

Guarantor's signatory (1)

Name:

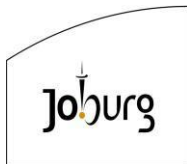
Designation:

Guarantor's signatory (2)

Name:

Designation:

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW13897
Northern Wastewater Treatment Works
Expansion of Capacity Unit 5 – Installation of
Mechanical and Electrical Equipment



Volume 1 Tender and Contract
Section C1 Forms and Securities

C1.3.2 Blasting Indemnity

Given by _____

*Company Registration No. _____

Address _____

a *Company incorporated with limited liability according to the company laws of the Republic of South Africa, *Partnership, *Close Corporation, *Public Company (hereinafter called the Contractor), represented herein by _____
in his capacity as the Contractor's _____
duly authorised hereto by a resolution of the Contractor dated _____
a certified copy of which resolution is attached to this Indemnity.

WHEREAS the Contractor has entered into a Contract with the Johannesburg Water (SOC) Ltd (hereinafter called the Employer) for,

_____ and the Company requires this Indemnity from the Contractor

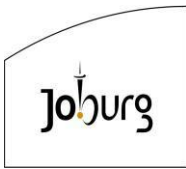
NOW THEREFORE THIS DEED WITNESSETH that the Contractor does hereby indemnify and hold harmless the Company in respect of all loss or damage that may be incurred or sustained by the Employer by reason of or in any way arising out of or caused by blasting operations that may be carried out by the Contractor in connection with the aforementioned Contract and also in respect of all claims that may be made against the Employer in consequence of such blasting operations, by reason of or in any way arising out of any accidents or damage to persons, life or property or any other cause whatsoever, and also in respect of all legal or other expenses that may be incurred by the Employer in examining, resisting or settling any such claims; for the due performance of which the Contractor binds itself according to law.

THUS, DONE AND SIGNED for and on behalf of the Contractor at _____
on the _____ day of _____ 20____ in the
presence of the subscribing witnesses.

As witnesses:

1. _____
Name & Surname Signature

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW13897
Northern Wastewater Treatment Works
Expansion of Capacity Unit 5 – Installation of
Mechanical and Electrical Equipment



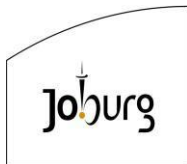
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Section C1 Forms and Securities

2. _____
Name & Surname Signature

Duly authorised to sign on behalf of: _____

Address: _____

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW13897
Northern Wastewater Treatment Works
Expansion of Capacity Unit 5 – Installation of
Mechanical and Electrical Equipment



Volume 1 Tender and Contract
Section C1 Forms and Securities

C1.3.3 Health and Safety Contract Between Employer and Contractor in Terms of Section 37(2) of the Occupational Health and Safety Act No 85 Of 1993

Written agreement between Johannesburg Water ((Proprietary) Limited (hereinafter referred to as “the Employer) and _____ (hereinafter referred to as “the mandatory”) as envisaged by Section 37(2) of the Occupational Health and Safety Act, No. 85, of 1993 as amended.

I _____ representing _____ (mandatory) do hereby acknowledge that _____ (mandatory) is an employer in its own right and shall be regarded as the employer for purposes of the contract work specified in the body of the principal agreement with duties as prescribed in the Occupational Health and Safety Act, No. 85 of 1993 as amended so as to ensure that all work will be performed or machinery and plant used in accordance with the provisions of the said Act. I furthermore agree to comply with the requirements of the Employer as contained in the Occupational Health and Safety Specification included with the principal agreement and to liaise with the employer should I, for whatever reason, be unable to perform in terms of this agreement.

Signed this ____ day of _____ at ____

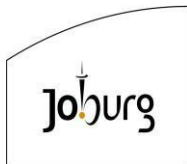
Signature on behalf of mandatory _____

Signature on behalf of Employer _____

Compensation Fund Registration No. of mandatory _____

Good Standing Certificate : ☐ yes ☐ no (tick one box)

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW13897
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Mechanical and Electrical Equipment

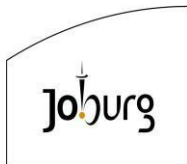


Volume 1 Tender and Contract
Section C1 Forms and Securities

C1.3.4 Health and Safety Contract: General Information

1. The Occupational Health and Safety Act comprises Sections 1 to 50 and all un-repealed regulations promulgated in terms of the former Machinery and Occupational Safety Act No 6 of 1983 as amended, as well as other regulations which may be promulgated in terms of the OHS Act.
2. 'Mandatory' is defined as including an agent, a contractor or a subcontractor for work, but without derogating from his status in his own right as an employer or user of plant and machinery
3. Section 37 of the Occupational Health and Safety Act potentially punishes employers (principals) for the unlawful acts or omissions of mandataries (contractors) save where a written agreement between the parties has been concluded containing arrangements and procedures to ensure compliance with the said Act by the mandatory.
4. All documents attached or referred to in the above agreement form an integral part of the agreement.
5. To perform in terms of this agreement mandataries must be familiar with the relevant provisions of the Act.
6. Mandataries who utilise the services of their own mandataries (subcontractors) are advised to conclude a similar written agreement.
7. Be advised that this agreement places the onus on the mandatory to contact the Employer in the event of inability to perform as per this agreement. The Employer, however, reserves the right to unilaterally take any steps as may be necessary to enforce this agreement.
8. The contractor shall be responsible for the full and proper implementation of the terms and provisions of the Act and its regulations in the area in which the work is to be undertaken by the Contractor.
9. The Contractor shall be responsible for the well-being, in relation to health and safety, of all persons coming upon or into such area in accordance with that legislation, including the implementation of any directives issued by management of the Employer in this respect.
10. The work to be done is **JW13897: EXPANSION OF CAPACITY UNIT 5 – INSTALLATION OF MECHANICAL AND ELECTRICAL EQUIPMENT**
11. The area in which the work is to be conducted is _____
12. The Contractor shall familiarise himself with such area and all risks existing thereon and undertakes to report to the representative of the Employer any hazard or risk to health and safety which arises during the contract work in the area concerned and over which the Contractor may have no control. All necessary and appropriate safety / health equipment shall be issued by the Contractor to all persons working on or coming into the area.

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW13897
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Mechanical and Electrical Equipment



Volume 1 Tender and Contract
Section C1 Forms and Securities

C1.3.4.1 Occupational Health and Safety Indemnity Undertaking

I, the undersigned _____
in my capacity as _____
of the firm _____

1. Hereby undertake to ensure that I/my firm and/or employees and/or subcontractors and/or his employees -
 - 1.1 comply strictly with the provisions of the Occupational Health and Safety Act of 1993 (as amended) and/or the regulations promulgated in terms thereof, with specific reference to section 37(2) of the said act, as well as any relevant legislation, in the course of the performance/execution of any service and/or work in, to or on any of the Employer's buildings, construction sites and/or premises;
 - 1.2 ensure that consultants and/or visitors comply with any instructions and measures relating to occupational health and safety, as prescribed by the Employer; and
 - 1.3 comply strictly with the statutorily prescribed work systems, operational equipment, machinery and occupational health and safety conditions;
2. And as an independent employer and contractor, hereby indemnify, in terms of the above undertakings, the Employer -
 - 2.1 in respect of any costs that I/my firm and/or employees and/or subcontractors and their employees may incur of necessity in compliance with the above undertakings; and
 - 2.2 against any claims that may be instituted against the Employer and/or any liability that the Employer may incur, whether instituted and/or caused by me/my firm's employees, agents, consultants, subcontractors and/or their employees and visitors or the Employer's clients or neighbours in respect of any incidents related to my/my firm's activities and as a result of which the occupational health and safety of the persons involved have been detrimentally affected; and
 - 2.3 against similar claims that I, managers or directors of my firm may have against the Employer and any damages for which I, managers or directors of my firm hold the Employer liable.
3. My firm's compensation commissioner number is _____
and I confirm that my firm and its subcontractors' fees have been paid up and obligations in respect of the compensation commissioner have been complied with and further that I shall furnish proof thereof in writing on request.
4. I hereby confirm that I have the authority to sign this indemnity undertaking and that the Employer is not obliged to confirm such confirmation.

Signed at _____ This _____ day of _____

Signature Capacity

As witnesses:

1 _____

2 _____

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW13897
Northern Wastewater Treatment Works:
Expansion of Capacity Unit 5 – Installation of
Mechanical and Electrical Equipment



Volume 1 Tender and Contract
Section C1 Agreement and Contract Data

Johannesburg Water (SOC) Ltd



CONTRACT JW13897

NORTHERN WASTEWATER TREATMENT WORKS

**EXPANSION OF CAPACITY UNIT 5 – INSTALLATION OF MECHANICAL AND
ELECTRICAL EQUIPMENT**

VOLUME 1

PART 2: PRICING DATA

Employer:		Contractor:	
Witness:		Witness:	

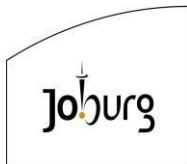
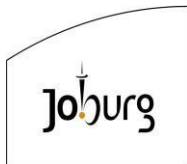


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	Summary of Bill of Quantities PD.82

Employer:		Contractor:	
Witness:		Witness:	



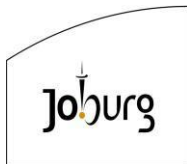
C2 PRICING DATA

C2.1 PRICING INSTRUCTIONS

C2.1.1 General preamble to the bill of quantities (Engineering works)

- a) All items in the Bill of Quantities, except where otherwise specified in Clause 8 of a Standardised Specification or in the Project Specification, shall be measured and shall cover operations as recommended in the standard system of measurement of civil engineering quantities, published under the title “Civil Engineering Quantities”, by the South African Institution of Civil Engineering.
- b) The basis and principles of measurement and payment are described in this section (Pricing Instructions) and Clause 8 of each of the Standardised Specifications for Civil Engineering Construction. The applicable SANS 1200 Standardised Specifications are listed in the Scope of Work, Portion 1: Project Specifications. Variations and amendments to the Project Standard Specifications are contained in the Scope of Work, Portion 2: Variations and/or Additions to the Project Standard Specifications.
- c) Descriptions in the Bill of Quantities are abbreviated and comply generally with those in the Standardised Specifications. Clause 8 of each Standardised Specification, read together with the relevant clauses of the Scope of Work, set out what ancillary or associated activities are included in the rates for the operations specified. Should any requirements of the measurement and payment clause of the applicable Standardised Specification or the Scope of Work, conflict with the terms of the Bill of Quantities, the requirements of the Standardised Specification or Scope of Work, as applicable, shall prevail.
- d) The clauses in a specification in which further information regarding the Schedule item may be found are listed in the “Payment Refers” column in the Schedule. The reference clauses indicated are not necessarily the only sources of information in respect of listed items. Further information and specifications may be found elsewhere in the Contract Documents. Standardised Specifications are identified by the letter or letters which follow SANS in the SANS 1200 series of specifications, e.g. G for SANS 1200G.
- e) Unless otherwise stated, items are measured net in accordance with the drawings, and no allowance is made for waste.
- f) The quantities set out in the Bill of Quantities are the estimated quantities of the Contract Works, but the Contractor shall be required to undertake whatever quantities may be directed by the Employer’s Agent from time to time. The Contract Price for the completed Works shall be computed from the actual quantities of work done, valued at the relevant unit rates and/or prices. The Contractor must not order the quantities of materials stated in the Bill of Quantities until he has confirmed from the Construction Drawings or measurement on Site that such quantities are in fact the correct quantities.
- g) The rates and/or prices to be inserted in the Bill of Quantities are to be the full inclusive prices for the work described under the several items. Such rates and/or prices shall cover all costs and expenses that may be required in and for the execution of the work described, and shall cover the cost of all general risks, liabilities, and obligations set forth or implied in the documents, as well as overhead charges and profit. Reasonable charges shall be inserted as these shall be used as a basis for assessment of payment for additional work that may have to be carried out.

Employer:		Contractor:	
Witness:		Witness:	



Volume 1 Tender and Contract

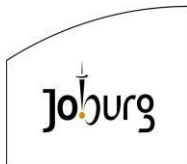
Section C2 Pricing Data

- h) A price or rate is to be entered against each item in the Bill of Quantities, whether the quantities are stated or not. An item against which no price is entered will be considered to be covered by the other prices or rates in the Schedule.
- i) The units of measurement described in the Bill of Quantities are metric units. Alternatives used are as follows:
- | | | | | |
|---------------------|---|-----------------------|----------|---------------------|
| mm | = | millimetre | = | hour |
| m | = | metre | kg | = kilogram |
| km | = | kilometre | t | = ton (1000kg) |
| m ² | = | square metre | No. | = number |
| m ² pass | = | square metre pass | sum | = lump sum |
| ha | = | hectare | MN | = mega-newton |
| m ³ | = | cubic metre | MN.m | = mega-newton-metre |
| m ³ km | = | cubic metre-kilometre | PC sum | = Prime Cost sum |
| l | = | litre | Prov sum | = Provisional sum |
| kl | = | kilolitre | % | = percent |
| MPa | = | megapascal | kW | = kilowatt |
| W/day | = | Workday | R/only | = Rate only |
- j) For the purpose of this Bill of Quantities, where applicable, the following words shall have the meanings hereby assigned to them:
- Unit : The unit of measurement for each item of work as defined in the SANS Standard Specification for South African National Standards.
- Quantity : The number of units of work for each item.
- Rate : The agreed payment per unit of measurement.
- Amount : The product of the quantity and the agreed rate for an item.
- Lump sum: An agreed amount for an item, the extent of which is described in the Bills of Quantities, but the quantity of work of which is not measured in any units.
- k) Arithmetical errors in the Bill of Quantities shall be corrected in accordance with Clause C3.9 of the Conditions of Tender. Should there be any discrepancy between rates and/or prices written in the Assessment Schedule and the Bill of Quantities, the latter shall govern.
- l) While the Employer has every intent to complete the full scope of works, the Employer reserves the right to reduce or increase the scope of works according to the budget, or to terminate this contract, with adjustment to the agreed rates, sums or fees and without payment of any penalty in this regard. The Service Provider shall however be entitled to pro-rata payment for all services carried out in terms of any adjustment to the Scope of Work or, in the case of termination, remuneration and/or reimbursement.
- m) The Bill of Quantities shall be completed by hand in INK or TYPED. The Bill of Quantities in the tender document may be replaced with the typed electronic Bill of Quantities, without changing the quantities, items and description.

C2.1.2 Sufficiency of tender

The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his Tender for the construction of the Works and of the rates and prices, which rates and prices shall, except in so far as it is otherwise provided in the Contract, cover all his obligations under the Contract and all matters and things necessary for the proper execution and completion of the Works.

Employer:		Contractor:	
Witness:		Witness:	



C2.1.3 Special Payment Conditions

This clause shall be read in conjunction with the 'Penalties' clause(s). Where the penalty clause shall always receive precedence over this clause, should it be found that duplicative financial corrective measures exist.

C2.1.3.1 Applicability of payment items

All payment items forming part of this Contract shall not apply to ordered Works completed by the Contractor under this Contract, where completed Works:

- are not completed to acceptable quality;
- are not issued by the Employer's Agent;
- are still within the defects and liability period; or
- are not accepted by the Employer's Agent or his duly authorised representative.

C2.1.3.2 Security

The Contractor shall have been deemed to have included all security related costs in the Provisional and General item rates, including allowing for minimum 100% (high risk areas) of the sites requiring security provision for the Employer and Engineer representative(s).

C2.1.3.3 Materials and equipment

The Employer shall not provide any works material and equipment, as this shall be provided by the Contractor and deemed to have been included in his provided activity rates or prices.

C2.1.3.4 Permits and way-leaves

All associated costs to obtain permits and wayleaves as required for the execution of the works, where such affect other services, shall be deemed to have been included in the scheduled rates for SANS 1200A or SANS 1200AA or SANS 1200AB where pricing provision for such items have been allowed for in the pricing schedules, alternatively it shall be deemed to be included in the various scheduled activity rates or prices provided by the Contractor

C2.1.3.5 Confined space

The Contractor shall note that work activities shall be executed within confined spaces, and it shall be deemed that allowance has been made in all activity pricing.

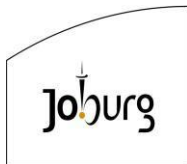
C2.1.3.6 Payment ONLY for works completed.

The Contractor shall note that payment shall only be made for Works activities successfully (delivering the end result) executed, complying with the quality requirements and provided to the Engineer or his duly authorised representative.

C2.1.3.7 Working outside normal hours

The additional costs, if any, to perform works outside normal working hours shall be deemed to have been allowed for in the provided activity pricing rates and/or prices.

Employer:		Contractor:	
Witness:		Witness:	



C2.1.4 Health and Safety

The principal Contractor's health and safety plan has to follow the framework as laid out in the HEALTH AND SAFETY SPECIFICATION AND ENVIRONMENTAL MANAGEMENT PLAN, as a minimum.

No payment shall be applicable where equipment is not provided and services are not rendered in terms of the approved Health and Safety Plan. Additionally, the Contractor shall also be penalised in terms of Clause (30) of the Occupational Health and Safety Act 183 (1993), Construction Regulations (2014).

C2.1.4.1 Compilation of health and safety plan

Unit: Sum

The rate shall include the complete cost for the provision of resources (human and equipment), communication, transportation and travelling, documentation of activities and reporting activities required to compile a Health and Safety Plan as per the Health and Safety Specifications contained in Volume 2, and approval of such plan thereof. Remuneration shall be a lump sum.

C2.1.4.2 Implementation of health and safety plan

Unit: Sum

The rate shall include the complete cost for the provision of resources (human and equipment), communication, transportation and travelling, documentation of activities and reporting activities required to fully comply with the implementation and maintenance of the Health and Safety Plan. Remuneration shall be on a monthly basis for services rendered, by dividing the total sum tendered by the construction duration.

Safety officer

Unit: Sum

The rate shall include the wages and salary that is to be paid to the safety officer/s, whose responsibility it is to ensure that all activities required fully comply with the Health and Safety Plan as per the Health and Safety Specifications contained in Volume 2 for the duration of the Contract. The rate shall be on a monthly basis for services rendered, by dividing the total sum tendered by the construction duration.

NOTE: The Contractor shall clearly state the number of Health and Safety officers in the provided space in the Bill of Quantities that he has allowed for in his price. Where no number is provided the Employer shall assume that adequate provision, minimum one (1) per site, has been made to implement the provided Health and Safety Plan successfully.

C2.1.5 EMP Implementation and Maintenance

Unit: Sum

The rate shall include the complete cost for the provision of resources (human and equipment), communication, transportation and travelling, documentation of activities and reporting activities required to fully comply with the implementation and maintenance of the EMP contained in Volume 2 for the duration of the Contract. Remuneration shall be on a monthly basis for services rendered, by dividing the total sum tendered by the construction duration.

Employer:		Contractor:	
Witness:		Witness:	



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No payment shall be applicable where equipment is not provided and services are not rendered in terms of the approved EMP.

C2.1.6 SMME Portion of the Works

A portion of the works must be allocated for completion by appointed SMMEs.

The Main Contractor shall retain liability and responsibility for the management, scheduling, and quality control of all works performed by the sub-contractors. After appointment of the Main Contractor, Johannesburg Water will supply the Main Contractor with a list of SMMEs which the Main Contractor can approach to provide rates for the items envisaged for subcontracting. The Main Contractor will be expected to conduct a competitive process to recommend a Sub-Contractor or Sub-Contractors to Johannesburg Water. Johannesburg Water will then evaluate all rates provided by the Sub-Contractor for fairness. Johannesburg Water will then either a) approve the appointment of the Sub-Contractor or Sub-Contractors or b) enter into negotiations with the Main Contractor and Sub-Contractor / s or c) request that the Contractor recommend a different Sub-Contractor.

Further an allowance has been made for the Contractor to complete the following tasks:

- The Contractor shall ensure that the Sub-Contractor(s) complies with paying all amounts due in respect of his employees and himself in terms of all relevant legislation and regulations including, but not confined to, the
 - Income Tax Act, the
 - Compensation for Occupational Injuries and Diseases Act,
 - Unemployment Insurance Act,
 - Basic Conditions of Employment Act
- Monitoring of the Quality of Work completed by the Sub-contractor/SMME
- Skills transfer during the execution of the project
- Compliance with all aspects of the Scope of Work
- Assistance with sourcing of applicable material in line with the technical data sheets

Further an allowance has been made for “Training” – this is related to CETA accredited training which is to be agreed with the Employer during project execution. No amount can be claimed under this item for on-site or on-the-job training, only for accredited training which the SMME receives.

Should any delays be experienced during the period of the Contract due to the appointment of subcontractors by the Contractor, work stoppages by subcontractors, industrial action by subcontractors, etc. such delays shall be assigned to the Contractor, and no claims for Extension of Time will be entertained by the Employer.

Employer:		Contractor:	
Witness:		Witness:	



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ITEM NO	PAYMENT REFERENCE	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
1.1		SECTION 1 : PRELIMINARY AND GENERAL (MECHANICAL WORKS)				
1.1.1		BILL 1.1 - FIXED CHARGE ITEMS				
		Contractual Requirements, sureties, insurance etc	Sum	1		
		Establishment of Facilities on the Site :				
	PS 4.7	Facilities for Engineer				
1.1.2	PS 4.7	a. Nameboards as per Drg. No. 30300141/007	No	2		
	PS 4.9	Facilities for Contractor				
1.1.3		a. Offices and storage sheds	Sum	1		
1.1.4		b. Workshops	Sum	1		
1.1.5		c. Laboratories	Sum	1		
1.1.6	PS 4.16	d. Living accommodation	Sum	1		
1.1.7	PS 4.10	e. Ablution and latrine facilities	Sum	1		
1.1.8		f. Tools and equipment	Sum	1		
1.1.9		g. Water supplies, electric power and ' communications	Sum	1		
1.1.10		h. Dealing with water	Sum	1		
1.1.11		i. Access	Sum	1		
		j. Plant	Sum	1		
1.1.12		1. Craneage	Sum	1		
1.1.13		2. Other Plant (designate)	Sum	1		
1.1.14		Other fixed charge obligations	Sum	1		
1.1.15		Removal of Engineer's and Contractor's Site Establishment on completion	Sum	1		
1.1.16	PS 5	Quality Control Plan	Sum	1		
1.1.17	PS 7	Compliance with the Occupational Health and Safety Act and Specification	Sum	1		
1.1.18	PS 8	Compliance with the Environmental Management Plan	Sum	1		
1.1.19	PS 5	Liaison with Authorities, opportunities to, and co operate with others on site	Sum	1		
1.2		BILL 1.2 - TIME-RELATED CHARGES				
1.2.1		Contractual Requirements, sureties, insurance etc	Sum	1		
		Operation and Maintenance of Facilities on Site, for Duration of Construction, except where otherwise stated:				
		Facilities for Engineer				
1.2.2	PS 4.7	a. Nameboards (2 off)	Sum	1		
	PS 4.7	Facilities for Contractor				
1.2.3	PS 4.9	a. Offices and storage sheds	Sum	1		
1.2.4		b. Workshops	Sum	1		
1.2.5		c. Laboratories	Sum	1		
1.2.6		d. Living accommodation	Sum	1		
1.2.7		e. Ablution and latrine facilities	Sum	1		
1.2.8		f. Tools and equipment	Sum	1		
1.2.9		g. Water supplies, electric power and ' communications	Sum	1		
1.2.10		i. Dealing with water	Sum	1		
1.2.11		j. Access	Sum	1		
TOTAL CARRIED FORWARD						



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TOTAL BROUGHT FORWARD						
		k. Plant	Sum	1		
1.2.12		1. Craneage	Sum	1		
1.2.13		2. Other Plant (designate)	Sum	1		
1.2.14	PS 5	Supervision for Duration of Construction	Sum	1		
1.2.15	PS 5	Company and Head Office Overhead Costs for the Duration of the Contract	Sum	1		
1.2.16	PS 5	Planning and programming	Sum	1		
1.2.17	PS 5	Quality Control Plan & Compliance thereof	Sum	1		
1.2.18	PS 7	Compliance with the Occupational Health and Safety Act and Specification	Sum	1		
1.2.19	PS 8	Compliance with the Environmental Management Plan	Sum	1		
1.2.20	PS 5	Liaison with Authorities, opportunities to and co operate with others on site	Sum	1		
1.3		<u>BILL 1.3 - OTHER GENERAL ITEMS</u>				
1.3.1	PS 6.5	Compulsory postponement of the issuing of Certificate of Completion	Rate/day	60		
1.3.2	PS 5.7.3	Servicing visits during maintenance period (Provisional)	No	4		
1.3.3	PS 6.8	Provision of complete Operation Manual as specified	Sum	1		
1.3.4						
1.3.5	PS 6.9.3	Workmen's Compensation ACT (application)	Sum	1		
1.3.6	PS 9.1	Maintenance of the complete mechanical works supplied under this contract	Rate/month	12		
1.3.7	PS 5.7	Training of operating and maintenance staff	Sum	1		
1.4		<u>BILL 1.4 - PROVISIONAL SUMS</u>				
		For work to be executed by Contractor and valued in terms of the "Valuation of Variations" clause in the Conditions of Contract				
1.4.1	PS 6.13	Employment of CLO	PC sum	18	15000.00	270 000.00
1.4.2		Overheads, Charges and profit on items 1.4.1 above	%			
1.4.3	PS 6.2	Armed Security	PC Sum	1		300 000.00
1.4.2		Overheads, Charges and profit on items 1.4.3 above	%			
		For work to be done by as instructed by the engineer.				
1.4.3	PS 6.7	Tools and Spares	ProvSum	1		350 000.00
1.4.4	PS 4.8	Facilities for the Engineer	ProvSum	1		250 000.00
1.4.5	PS 5.7	Control tests by the Engineer	ProvSum	1		125 000.00
1.4.6	PS 4.8	Time related cost for the facilities for the Engineer	ProvSum	1		150 000.00
1.4.7	PS 6,4	Additional meetings	ProvSum	1		60 000.00
1.4.8		Training of local labour	Prov.Sum	1		125 000.00
1.4.9		Surveys	Prov.Sum	1		125 000.00
1.4.10		Overheads, Charges and profit on items 1.4.3 to 1.4.8 above	%		1185000.00	
1.5		<u>BILL 1.5 - DAYWORK</u>				
1.5.1		a) Foreman	hr	100		
1.5.2		b) Skilled	hr	150		
1.5.3		c) Semi-skilled	hr	200		
1.5.4		d) Unskilled	hr	200		
1.5.5		e) Surveyor with transport, instruments and labour		50		
TOTAL CARRIED FORWARD						



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TOTAL BROUGHT FORWARD					
		Plant/Equipment			
1.5.6		a) Cranage (50 tons)	hr	80	
1.5.7		b) Front loader (CAT 930 [75 kW] or similar)	hr	50	
		c) Tip truck:			
1.5.8		1) 10m³	hr	50	
1.5.9		2) 6m³	hr	50	
		d) Backactor:			
1.5.10		1) 100 kW, 23 ton	hr	50	
1.5.11		2) TLB	hr	50	
		e) Compactors:			
1.5.12		1) Vibrating roller (Bomag 60 or similar)	hr	50	
1.5.13		2) Plate compactor	hr	50	
1.5.14		3) Rammer	hr	50	
1.5.15		f) Pneumatic Roller	hr	50	
1.5.16		g) Generator and Breaker	hr	50	
1.5.17		h) Other (Tenderer to specify).....	hr	75	
		Materials:			
1.5.18		a) Supplied by the Contractor under Dayworks	ProvSum	1	250000.00
1.5.19		b) Contractor's stated commission on the 1.4.23 provisional sum above	%	1	
1.6		BILL 1.6 - TEMPORARY WORKS			
1.6.1		Main Access Road to Works	Sum	1	
1.6.2		Dealing with Traffic	Sum	1	
		Existing Services			
1.6.3		c) Excavation by hand to expose existing services in all types of materials	m³	100	
1.7		BILL 1.7 FORWARD COVER			
1.7.1	PS 6.6	In respect of the total value of imported content of goods used in the treatment works			
		Allow a Provisional Sum to cover variation in exchange rate prior to obtaining forward cover			
1.7.2	PS 6.6	Tenderer is to insert an amount = 10% of the above amount from Item 1.6.1	ProvSum	1	
1.7.3	PS 6.6	Allow a Provisional Sum to cover the cost of forward cover Tenderer is to insert an amount = 5% of the above amount from Item 1.6.2	ProvSum	1	
1.7.4	PS 6.6	Allowance as a percentage of the PC value of Items under 1.6.2 and 1.6.3 for Contractor's cost and profit. Tenderer to insert sum rate and state percentage.	%		
		BILL 1.8 SMME'S			
1.8.1		Allowance for appointing and handling work done by approved SMME'S			
TOTAL CARRIED TO SUMMARY					

ITEM NO	PAYMENT REFERENCE	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
M 2.1	PS 9.2.4	SECTION 2 : DESIGN, SUPPLY AND DELIVERY OF MECHANICAL EQUIPMENT FOR AERATORS. Design, Manufacture and Delivery of equipment for the mechanical aerators including baffles as required In accordance with the Specification and drawings				
M 2.1.1	PS 9.2.4	Zone 1 - 110 kW mechanical surface aerators complete including aerator cone, drive shaft, slow speed coupling, gearbox, mounting plate, jacking screws, high speed coupling, baffles and electric motor in accordance with the specification and drawings.	No	3		
M 2.1.2	PS 9.2.4	Zone 2 - 110 kW mechanical surface aerators complete including aerator cone, drive shaft, slow speed coupling, gearbox, mounting plate, jacking screws, high speed coupling, baffles and electric motor in accordance with the specification and drawings.	No	2		
M 2.1.2A	PS 9.2.4	Zone 2 - 90 kW mechanical surface aerators complete including aerator cone, drive shaft, slow speed coupling, gearbox, mounting plate, jacking screws, high speed coupling, baffles and electric motor in accordance with the specification and drawings.	No	2		
M 2.1.3	PS 9.2.4	Zone 3 - 90 kW mechanical surface aerators complete including aerator cone, drive shaft, slow speed coupling, gearbox, mounting plate, jacking screws, high speed coupling, baffles and electric motor in accordance with the specification and drawings.	No	2		
M 2.1.4	PS 9.2.4	Zone 3 - 75 kW mechanical surface aerators complete including aerator cone, drive shaft, slow speed coupling, gearbox, mounting plate, jacking screws, high speed coupling, baffles and electric motor in accordance with the specification and drawings.	No	1		
M 2.1.5	PS 9.2.4	Zone 4 - 22kW mechanical surface aerators complete including aerator cone, drive shaft, slow speed coupling, gearbox, mounting plate, jacking screws, high speed coupling, baffles and electric motor in accordance with the specification and drawings.	No	3		
M 2.1.6	PS 9.2.4	Portable steel frame for maintenance of the aerators complete as specified	No	1		
M 2.1.7		Recommended spares	PC sum	1		650 000.00
M 2.1.8		Inspection if civil works for the detailed design of the mechanical equipment to ensure compatability.	Sum	1		
M 2.2	PS 9.2.4	Installation, testing and commissioning of equipment for the Mechanical aerators In accordance with the Specification and drawings.				
M 2.2.1	PS 9.2.4	Complete 110 kW Aerators as supplied under item 2.1.1	No	3		
M 2.2.2	PS 9.2.4	Complete 110 kW Aerators as supplied under item 2.1.2	No	2		
M 2.2.3	PS 9.2.4	Complete 90 kW Aerators as supplied under item 2.1.2	No	2		
M 2.2.4	PS 9.2.4	Complete 90 kW Aerators as supplied under item 2.1.3	No	2		
M 2.2.5	PS 9.2.4	Complete 75 kW Aerators as supplied under item 2.1.4	No	1		
M 2.2.6	PS 9.2.4	Complete 22 kW Aerators as supplied under item 2.1.5	No	3		
M 2.3		Cost for the conducting of insitu Oxygenation Efficiency tests as detailed in the general specification M06 - Mechanical Aeration Equipment, if requested by the Engineer	PC sum	1		250 000.00
M 2.4		CIVIL WORKS				
M 2.4.1		Grouting and screeding off all aspects of the mechanical installation	sum	1		
2 TOTAL CARRIED TO SUMMARY						

ITEM NO	PAYMENT REFERENCE	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
M 3.1	PS 9.3.4	<u>SECTION 3 : DESIGN, SUPPLY, DELIVERY OF THE MECHANICAL EQUIPMENT FOR THE MIXERS</u> Design, Manufacture and deliver Mechanical equipment for the Mixers In accordance with the Specification and drawings				
M 3.1.1	PS 9.3.4	Pre Anoxic Zone - 7.5 kW mechanical surface mounted mixer complete including impellers, drive shaft, slow speed coupling, gearbox, mounting plate, high speed coupling and electric motor in accordance with the specification and drawings.	No	1		
M 3.1.2	PS 9.3.4	Anaerobic Zone - 7.5 kW mechanical surface mounted mixer complete including impellers, drive shaft, slow speed coupling, gearbox, mounting plate, high speed coupling and electric motor in accordance with the specification and drawings.	No	4		
M 3.1.3	PS 9.3.4	Anoxic Zone - 11.0 kW mechanical surface mounted mixer complete including impellers, drive shaft, slow speed coupling, gearbox, mounting plate, high speed coupling and electric motor in accordance with the specification and drawings.	No	4		
M 3.1.4	PS 9.3.4	Aeration Zone 3 - 15.0 kW mechanical surface mounted mixer complete including impellers, drive shaft, slow speed coupling, gearbox, mounting plate, high speed coupling and electric motor in accordance with the specification and drawings.	No	1		
M 3.1.5	PS 9.3.4	Balancing Tank - 11.0 kW mechanical surface mounted mixer complete including impellers, drive shaft, slow speed coupling, gearbox, mounting plate, high speed coupling and electric motor including computer simulation modelling of the mixer installation. in accordance with the specification and drawings.	No	6		
M 3.1.6	PS 9.3.4	Fermentation mixing Tank mixers - 7.5 kW mechanical surface mounted mixer complete including impellers, drive shaft, slow speed coupling, gearbox, mounting plate, high speed coupling and electric motor in accordance with the specification and drawings.	No	2		
M 3.1.7	PS 9.3.4	Portable steel frame for maintenance of the mixers complete as specified	No	1		
M 3.1.8		Recommended spares	PC sum	1		450 000.00
M 3.1.9		Inspection if civil works for the detailed design of the mechanical equipment to ensure compatability.	Sum	1		
M 3.2	PS 9.3.4	<u>SECTION 2 :INSTALL & COMMISSION OF THE MECHANICAL EQUIPMENT FOR THE MIXERS.</u> Installation, testing and commissioning of equipment for the Mechanical mixers In accordance with the Specification and drawings.				
M 3.2.1	PS 9.3.4	Complete 7.5 kW Mixers as supplied under item 3.1.1	No	1		
M 3.2.2	PS 9.3.4	Complete 7.5 kW Mixers as supplied under item 3.1.2	No	4		
M 3.2.3	PS 9.3.4	Complete 11 kW Mixers as supplied under item 3.1.3	No	4		
M 3.2.4	PS 9.3.4	Complete 15 kW Mixers as supplied under item 3.1.4	No	1		
M 3.2.5	PS 9.3.4	Complete 11 kW Mixers as supplied under item 3.1.5	No	6		
M 3.2.6	PS 9.3.4	Complete 7.5 kW Mixers as supplied under item 3.1.6	No	6		
M 3.2.7	PS 9.3.4	Portable steel frame as supplied under item 3.1.7	No	1		
M 3.3		CIVIL WORKS				
M 3.3.1		Grouting and screeding off all aspects of the mechanical installation	sum	1		
3	TOTAL CARRIED TO SUMMARY					



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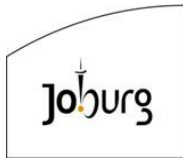
ITEM NO	PAYMENT REFERENCE	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
M 4.1	PS 9.4.4	<u>SECTION 4 : DESIGN, SUPPLY, DELIVERY OF THE MECHANICAL EQUIPMENT FOR THE MLSS RECIRCULATION PUMPS</u> Design, Manufacture and deliver Mechanical equipment for the MLSS Recirculation Pumps In accordance with the Specification and drawings				
M 4.1.1	PS 9.4.4	Recycle "a" - Aerobic Zone 3 to Anoxic Zone - Recirculation Pump. in accordance with the specification and drawings.	No	2		
M 4.1.2	PS 9.4.4	Recycle "b" - Anaerobic Zone to Pre Anoxic Zone - Recirculation Pump. in accordance with the specification and drawings.	No	2		
M 4.1.3	PS 9.4.4	Flap gate acting as a non return valves to suit recycle :a: pumps	No	2		
M 4.1.4	PS 9.4.4	Flap gate acting as a non return valves to suit recycle "b" pumps	No	2		
M 4.1.5	PS 9.4.4	Crawl beam with "A" type frame supports for maintenance of recycle pumps "a" and "b" complete with chain operated block and tackle designed to suite the pumps offered	No	2		
M 4.1.6		Recommended spares	PC sum	1		200 000.00
M 4.1.7		Inspection if civil works for the detailed design of the mechanical equipment to ensure compatability.	Sum	1		
		<u>SECTION 4 :INSTALL & COMMISSION OF THE MECHANICAL EQUIPMENT FOR THE MLSS RECIRCULATION PUMPS.</u>				
M 4.2	PS 9.4.4	Installation, testing and commissioning of equipment for the Mechanical equipmen for the MLSS Recirculaton pumps In accordance with the Specification and drawings.				
M 4.2.1	PS 9.4.4	Complete Recirculation pumps as supplied under item 4.1.1	No	2		
M 4.2.2	PS 9.4.4	Complete Recirculation pumps as supplied under item 4.1.2	No	2		
M 4.2.3	PS 9.4.4	Complete non return valves as supplied under item 4.1.3	No	2		
M 4.2.4	PS 9.4.4	Complete Flap Gates as supplied under item 4.1.4	No	2		
M 4.2.5	PS 9.4.4	Complete lifting frames as supplied under item 4.1.5	No	2		
M 4.3		CIVIL WORKS				
M 4.3.1		Grouting and screeding off all aspects of the mechanical installation	sum	1		
4 TOTAL CARRIED TO SUMMARY						



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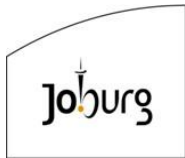
ITEM NO	PAYMENT REFERENCE	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
M 5.1	PS 9.5.4	<u>SECTION 5 : DESIGN, SUPPLY, DELIVERY OF THE MECHANICAL EQUIPMENT FOR THE RAS RECIRCULATION PUMPS</u> Design, Manufacture and deliver of the Mechanical equipment for the RAS Recirculation Pumps In accordance with the Specification and drawings				
M 5.1.1	PS 9.5.4	Recycle "S" - Return Sludge to Pre Anoxic Zone - Recirculation Archemedian Screw Pump Complete. in accordance with the specification and drawings.	No	2		
M 5.1.2		Recommended spares	PC sum	1		300 000.00
M 5.1.3		Inspection if civil works for the detailed design of the mechanical equipment to ensure compatability.	Sum	1		
M 5.2	PS 9.5.4	<u>SECTION 5 :INSTALL & COMMISSION OF THE MECHANICAL EQUIPMENT FOR THE RAS RECIRCULATION PUMPS.</u> Installation, testing and commissioning of equipment for the Mechanical equipmen for the MLSS Recirculaton pumps In accordance with the Specification and drawings				
M 5.2.1	PS 9.5.4	Complete Recirculation pumps as supplied under item 5.1.1	No	2		
M 5.3		CIVIL WORKS				
M 5.3.1		Grouting and screeding off all aspects of the mechanical installation	sum	1		
5 TOTAL CARRIED TO SUMMARY						



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ITEM NO	PAYMENT REFERENCE	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
6		<u>SECTION 6 : DESIGN, SUPPLY, DELIVERY OF THE MECHANICAL EQUIPMENT FOR THE PST's</u>				
M 6.1	PS 9.6.4	Design, Manufacture and deliver Mechanical equipment for PST's In accordance with the Specification and drawings				
M 6.1.1	PS 9.6.4	Complete mechanical equipment for PST's in accordance with the specification and drawings.	No	2		
M 6.1.2	PS 9.6.4	200mm Diameter electrically operated knife gate valves as specified in accordance with the specification and drawings.	No	2		
M 6.1.3		Recommended spares	PC sum	1		100 000.00
M 6.1.4		Inspection if civil works for the detailed design of the mechanical equipment to ensure compatability.	Sum	1		
		<u>SECTION 6 : INSTALLATION AND COMMISSIONING OF THE MECHANICAL EQUIPMENT FOR THE PST's</u>				
M 6.2	PS 9.6.4	Installation, testing and commissioning of mechanical equipment for PST's in In accordance with the Specification and drawings				
M 6.2.1	PS 9.6.4	Complete mechanical equipment for PST's as supplied under item 6.1.1	No	2		
M 6.2.2	PS 9.6.4	200mm Diameter electrically operated knife gate valve as supplied under item 6.1.2	No	2		
M 6.3		CIVIL WORKS				
M 6.3.1		Grouting and screeding off all aspects of the mechanical installation	sum	1		
6	TOTAL CARRIED TO SUMMARY					



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ITEM NO	PAYMENT REFERENCE	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
7		<u>SECTION 7 : DESIGN, SUPPLY AND DELIVERY OF THE MECHANICAL EQUIPMENT FOR THE SST's</u>				
M 7.1	PS 9.7.4	Design, Manufacture and deliver Mechanical equipment for SST's in accordance with the Specification and drawings				
M 7.1.1	PS 9.7.4	Complete mechanical equipment for SST's in accordance with the specification and drawings.	No	2		
M 7.1.2		Recommended Spares	PC sum	1		100 000.00
M 7.1.3		Inspection if civil works for the detailed design of the mechanical equipment to ensure compatability.	Sum	1		
		<u>SECTION 7 : INSTALLATION AND, COMMISSIONING OF THE MECHANICAL EQUIPMENT FOR THE SST's</u>				
M 7.2	PS 9.7.4	Installation, testing and commissioning of mechanical equipment for SST's in accordance with the Specification and drawings				
M 7.2.1	PS 9.7.4	Complete mechanical equipment supplied under item 7.1.1	No	2		
M 7.3		CIVIL WORKS				
M 7.31		Grouting and screeding off all aspects of the mechanical installation	sum	1		
7	TOTAL CARRIED TO SUMMARY					



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ITEM NO	PAYMENT REFERENCE	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
8		<u>SECTION 8 : DESIGN, SUPPLY AND DELIVERY OF THE MECHANICAL EQUIPMENT FOR THE SLUDGE THICKENERS</u>				
M 8.1	PS 9.8.4	Design, Manufacture and deliver Mechanical equipment for sludge thickeners in accordance with the Specification and drawings				
M 8.1.1	PS 9.8.4	Complete mechanical equipment for the sludge thickeners in accordance with the specification and drawings.	No	1		
M 8.1.2		Recommended spares	PC sum	1		100 000.00
M 8.1.3		Inspection if civil works for the detailed design of the mechanical equipment to ensure compatability.	Sum	1		
M 8.2		<u>SECTION 8 : INSTALLATION AND COMMISSIONING OF THE MECHANICAL EQUIPMENT FOR THE SLUDGE THICKENERS</u>				
M 8.2	PS 9.8.4	Installation, testing and commissioing of mechanical equipment for sludge thickeners in accordance with the Specification and drawings				
M 8.2.1	PS 9.8.4	Complete mechanical equipment supplied under item 8.1.1	No	1		
M 8.3		CIVIL WORKS Grouting and screeding off all aspects of the mechanical installation	sum	1		
8 TOTAL CARRIED TO SUMMARY						



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ITEM NO	PAYMENT REFERENCE	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
9		<u>SECTION 9 : DESIGN, SUPPLY AND DELIVERY OF THE MECHANICAL EQUIPMENT FOR THE VFA FERMENTERS</u>				
M 9.1	PS 9.9.4	Design, Manufacture and deliver Mechanical equipment for VFA Fermenters in accordance with the Specification and drawings				
M 9.1.1	PS 9.9.4	Complete mechanical equipment for the new VFA Fermenter in accordance with the specification and drawings	No	1		
M 9.1.2	PS 9.9.4	Complete mechanical equipment for the existing VFA Fermenter in accordance with the specifications and drawings	Sum	1		
M 9.1.3		Recommended spares	PC sum	1		100 000.00
M 9.1.4		Inspection if civil works for the detailed design of the mechanical equipment to ensure compatability.	Sum	1		
		<u>SECTION 9 : INSTALLATION AND COMMISSIONING OF THE MECHANICAL EQUIPMENT FOR THE VFA FERMENTERS</u>				
M 9.2	PS 9.9.4	Installation, testing and commissioning of mechanical equipment for the VFA Fermenters in accordance with the Specification and drawings				
M 9.2.1	PS 9.9.4	Removal of mechanical equipment from the existing VFA Thickener and stacked on site to where indicated by the Engineer or the Plant Manager	No	1		
M 9.2.2	PS 9.9.4	Complete mechanical equipment for the VFA Fermenters supplied under Item 9.1.1	No	1		
M 9.2.3	PS 9.9.4	Complete mechanical equipment for the VFA fermenter supplied under item 9.1.2	No	1		
		CIVIL WORKS				
M 9.3		Grouting and screeding off all aspects of the mechanical installation	sum	1		
9	TOTAL CARRIED TO SUMMARY					

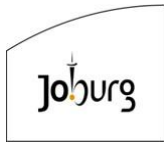


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ITEM NO	PAYMENT REFERENCE	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
M 10.1	PS 9.10.4	<u>SECTION 10 : DESIGN, SUPPLY AND DELIVERY OF THE MECHANICAL EQUIPMENT FOR FERRIC DOSING</u> Design, Manufacture and deliver Mechanical equipment for Ferric dosing system. In accordance with the Specification and drawings				
M 10.1.1	PS 9.10.4	30 m³ storage tank complete manufactured in GRP	No	1		
M 10.1.2	PS 9.10.4	Ferric dosing pumps complete with FRP mounting stand. In accordance with the Specification and drawings.	No	1		
M 10.1.3	PS 9.10.4	Interconnecting pipework, fittings, valves and pipe supports from the storage tanks to the pumps.	sum	1		
M 10.1.4	PS 9.10.4	Dosing pipework from dosing pumps to a point 1.0m outside the bund wall including fittings, valves, pressure release valves, pulsation dampers, back pressure valves and Calibration chambers In accordance with the Specification and drawings.	sum	1		
M 10.1.5	PS 9.10.4	Emergency eye and shower unit including all health and safety signage.	sum	1		
M 10.1.6		Recommended spares	PC sum	1		100 000.00
M 10.1.7		Provision for dosing pipework from dosing pump to reactor No 2	PC sum	1		150 000.00
M 10.1.8		Inspection if civil works for the detailed design of the mechanical equipment to ensure compatability.	Sum	1		
M 10.2	PS 9.10.4	<u>SECTION 10: INSTALLATION AND COMMISSIONING OF THE MECHANICAL EQUIPMENT FOR FERRIC DOSING.</u> Instalation, testing and commissioning of mechanical equipment for Ferric dosing system In accordance with the Specification and drawings				
M 10.2.1	PS 9.10.4	Complete mechanical equipment as supplied under item 10.1.1	sum	1		
M 10.2.2	PS 9.10.4	Complete mechanical equipment as supplied under item 10.1.2	sum	1		
M 10.2.3	PS 9.10.4	Complete mechanical equipment as supplied under item 10.1.3	sum	1		
M 10.2.4	PS 9.10.4	Complete mechanical equipment as supplied under item 10.1.4	sum	1		
M 10.2.5	PS 9.10.4	Complete mechanical equipment as supplied under item 10.1.5	sum	1		
M 10.3		CIVIL WORKS Grouting and screeding off all aspects of the mechanical installation	sum	1		
10 TOTAL CARRIED TO SUMMARY						

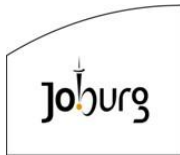
ITEM NO	PAYMENT REFERENCE	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
M 11.1	PS 9.11.4	<u>SECTION 11 : DESIGN, SUPPLY AND DELIVERY OF THE MECHANICAL EQUIPMENT FOR DISINFECTION DOSING</u> Design, Manufacture and delivery of mechanical equipment for disinfection dosing In accordance with the Specification and drawings				
M 11.1.1	PS 9.11.4	DBF Receiving tank 30m3 manufactured in GRP	No	1		
M 11.1.2	PS 9.11.4	DBF Storage tank 30m3 manufactured in GRP	No	1		
M 11.1.3	PS 9.11.4	Pipework, valves, fittings and supports from the tanker offloading point to the receiving tank and from the receiving tank to the storage tanks	Sum	1		
M 11.1.4	PS 9.11.4	Pipework, valves, fittings and supports from the storage tanks to the suction side of the dosing pump	Sum	1		
M 11.1.5	PS 9.11.4	Pipework, valves, fittings and supports for the dosing pump delivery up to 1.0m outside the bunded area	Sum	1		
M 11.1.6	PS 9.11.4	Dosing pump complete as specified - 0.23l/sec at 20m	No	1		
M 11.1.6		Provision for dosing pipework from dosing pump to connection with existing dosing line	PC sum	1		100 000.00
M 11.2	PS 9.11.4	<u>SECTION 11: INSTALLATION AND COMMISSIONING OF THE MECHANICAL EQUIPMENT FOR THE DISINFECTION DOSING.</u> Installation, testing and commissioning of mechanical equipment for the disinfection dosing system				
M 11.2.1	PS 9.11.4	Complete mechanical equipment as supplied under item 11.1.1	sum	1		
M 11.2.2	PS 9.11.4	Complete mechanical equipment as supplied under item 11.2.2	sum	1		
M 11.2.3	PS 9.11.4	Complete mechanical equipment as supplied under item 11.1.3	sum	1		
M 11.2.4	PS 9.11.4	Complete mechanical equipment as supplied under item 11.1.4	sum	1		
M 11.2.5	PS 9.11.4	Complete mechanical equipment as supplied under item 11.1.5	sum	1		
M 11.2.6	PS 9.11.4	Complete mechanical equipment as supplied under item 11.1.6	sum	1		
M 11.2.7	PS 9.11.4	Reposition the existing receiving tank including the necessary modification to the pipework and pipe supports	sum	1		
M 11.3		CIVIL WORKS Grouting and screeding off all aspects of the mechanical installation	sum	1		
11 TOTAL CARRIED TO SUMMARY						



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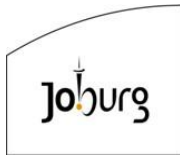
ITEM NO	PAYMENT REFERENCE	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
M 12		<u>SECTION 12 : DESIGN, SUPPLY AND DELIVERY OF THE MECHANICAL EQUIPMENT FOR PUMP STATIONS</u> Design, Manufacture and deliver Mechanical equipment for Pump Stations In accordance with the Specification and drawings				
M 12.1	PS9.12.2	WAS/Scum Pump Station				
M 12.1.1	PS9.12.8	Additional centrifugal pumps complete with motor, base plate, coupling and coupling guard.	No	1		
M 12.1.2	PS9.12.8	Suction and Discharge pipe work, valves, fittings and pipe supports for the additional pump.	sum	1		
M 12.1.3	PS9.12.8	Replacement of the existing centrifugal pumps complete with motor, base plate, coupling and coupling guard.	No	2		
M 12.1.4	PS9.12.8	Modifications to the suction and discharge pipe work, valves, fittings and pipe supports for the existing pumps.	sum	1		
M 12.1.5	PS9.12.8	Pump Station sump drainage pump complete with pipework, fittings, valves and supports.	No	1		
M 12.1.6		Inspection if civil works for the detailed design of the mechanical equipment to ensure compatability.	Sum	1		
M 12.2	PS9.12.3	Final Effluent sample pump				
M 12.2.1	PS9.12.8	Centrifugal self priming pump complete with motor, base plate, coupling and coupling guard.	No	1		
M 12.2.2	PS9.12.8	Suction and Discharge pipe work, valves, fittings and pipe supports.	sum	1		
M 12.2.3	PS9.12.8	50nb galvanised delivery pipe from sample pump to analysis building.	m	50		
M 12.3	PS9.12.4	Reactor No 2 sample pump				
M 12.3.1	PS9.12.8	Centrifugal self priming pump complete with motor, base plate, coupling and coupling guard.	No	1		
M 12.3.2	PS9.12.8	Suction and Discharge pipe work, valves, fittings and pipe supports.	sum	1		
M 12.3.3	PS9.12.8	50nb galvanised delivery pipe from sample pump to analysis building.	m	100		
M 12.4	PS9.12.5	Reactor No 1 sample pump				
M 12.4.1	PS9.12.8	Centrifugal self priming pump complete with motor, base plate, coupling and coupling guard.	No	1		
M 12.4.2	PS9.12.8	Suction and Discharge pipe work, valves, fittings and pipe supports.	sum	1		
M 12.4.3	PS9.12.8	50nb galvanised delivery pipe from sample pump to analysis building.	m	100		
12	TOTAL CARRIED FORWARD					



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BROUGHT FORWARD						
		<u>SECTION 12 : DESIGN, SUPPLY AND DELIVERY OF THE MECHANICAL EQUIPMENT FOR PUMP STATIONS</u>				
	PS9.12.8	Existing VFA Pump Station				
		Design, Manufacture and deliver Mechanical equipment for Pump Stations In accordance with the Specification and drawings				
M 12.5	PS9.12.8	VFA sludge transfer pumps				
M 12.5.1	PS9.12.8	Centrifugal pumps complete with motor, base plate, coupling and coupling guard.	No	2		
M 12.5.2	PS9.12.8	Suction and Discharge pipe work, valves, fittings and pipe supports for the new pumps as shown on the drawings.	sum	1		
M 12.5.3		Inspection if civil works for the detailed design of the mechanical equipment to ensure compatability.	Sum	1		
M 12.6	PS9.12.6b	Sump Drainage Pump				
M 12.6.1	PS9.12.8	Pump Station sump drainage pump complete with pipework, fittings, valves and supports.	No	1		
M 12.7	PS9.12.6c	Recycle Fermented Sludge Pumps				
M 12.7.1	PS9.12.8	Centrifugal self priming pump complete with motor, base plate, coupling and coupling guard.	No	2		
M 12.7.2	PS9.12.8	Suction and Discharge pipe work, valves, fittings and pipe supports complete as shown on the drawings.	sum	1		
M 12.7.3		Inspection if civil works for the detailed design of the mechanical equipment to ensure compatability.	Sum	1		
M 12.8	PS9.12.6d	Elutriant Pumps				
M 12.8.1	PS9.12.8	Centrifugal self priming pump complete with motor, base plate, coupling and coupling guard.	No	3		
M 12.8.2	PS9.12.8	Suction and Discharge pipe work, valves, fittings and pipe supports for the new pump including modifications to the existing pipework to suit the replacement pumps.	sum	1		
M 12.8.3		Inspection if civil works for the detailed design of the mechanical equipment to ensure compatability.	Sum	1		
12	TOTAL CARRIED FORWARD					



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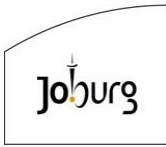
ITEM NO	PAYMENT REFERENCE	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BROUGHT FORWARD						
		<u>SECTION 12 : DESIGN, SUPPLY AND DELIVERY OF THE MECHANICAL EQUIPMENT FOR PUMP STATIONS</u>				
	PS9.12.7	New VFA Pump Station				
		Design, Manufacture and deliver Mechanical equipment for Pump Stations In accordance with the Specification and drawings				
M 12.9	PS9.12.7a	VFA sludge transfer pumps				
M 12.9.1	PS9.12.8	Centrifugal pumps complete with motor, base plate, coupling and coupling guard.	No	2		
M 12.9.2	PS9.12.8	Suction and Discharge pipe work, valves, fittings and pipe supports for the new pumps as shown on the drawings.	sum	1		
M 12.9.3		Inspection if civil works for the detailed design of the mechanical equipment to ensure compatability.	Sum	1		
M 12.10	PS9.12.7b	Sump Drainage Pump				
M 12.10.1	PS9.12.8	Pump Station sump drainage pump complete with pipework, fittings, valves and supports.	No	1		
M 12.11	PS9.12.7c	Recycle Fermented Sludge Pumps				
M 12.11.1	PS9.12.8	Centrifugal self priming pump complete with motor, base plate, coupling and coupling guard.	No	2		
M 12.11.2	PS9.12.8	Suction and Discharge pipe work, valves, fittings and pipe supports for the new pumps as shown on the drawings.	sum	1		
M 12.12	PS9.12.7d	Thickened sludge Digester feed pumps				
M 12.12.1	PS9.12.8	Centrifugal self priming pump complete with motor, base plate, coupling and coupling guard.	No	3		
M 12.12.2	PS9.12.8	Suction and Discharge pipe work, valves, fittings and pipe supports for the new pumps as shown on the drawings.	sum	1		
M 12.13		Lifting Equipment				
M 12.13.1	PS9.12.8	2000kg block and tackle for the New FVA pump station	No	1		
M 12.14		Existing HOW - repairs to grit removal system				
M 12.14.1		PC Sum for replacement of blowers	PC Sum	1		500 000.00
M 12.14.2		Contractors Mark up on item 12.15.1	%age			
M 12.15		Recommended spares	PC sum	1		500 000.00
M 12.16		Provision for pipes, valves and fittings	PC sum	1		350 000.00
M 12.17		CIVIL WORKS Grouting and screeding off all aspects of the mechanical installation	sum	1		
12	TOTAL CARRIED FORWARD					



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BROUGHT FORWARD						
		<u>SECTION 12 :INSTALLATION, TESTING AND COMMISSIONING OF MECHANICAL EQUIPMENT FOR PUMP STATIONS</u>				
M 12.15	PS9.12.2	WAS/Scum Pump Station				
M 12.15.1	PS9.12.8	Equipment supplied under item 12.1.1	No	1		
M 12.15.2	PS9.12.8	Equipment supplied under item 12.1.2	No	1		
M 12.15.3	PS9.12.8	Equipment supplied under item 12.1.3	No	2		
M 12.15.4	PS9.12.8	Equipment supplied under item 12.1.4	sum	1		
M 12.15.5	PS9.12.8	Equipment supplied under item 12.1.5	sum	1		
M 12.16	PS9.12.3	Finel Effluent sample pump				
M 12.16.1	PS9.12.8	Equipment supplied under item 12.2.1	No	1		
M 12.16.2	PS9.12.8	Equipment supplied under item 12.2.2	No	1		
M 12.16.3	PS9.8.3.2.2	Equipment supplied under item 12.2.3	m	50		
M 12.17	PS9.12.4	Reactor No 2 sample pump				
M 12.17.1	PS9.12.8	Equipment supplied under item 12.3.1	No	1		
M 12.17.2	PS9.12.8	Equipment supplied under item 12.3.2	No	1		
M 12.17.3	PS9.12.8	Equipment supplied under item 12.3.3	m	100		
M 12.18	PS9.12.5	Reactor No 1 sample pump				
M 12.18.1	PS9.12.8	Equipment supplied under item 12.4.1	No	1		
M 12.18.2	PS9.12.8	Equipment supplied under item 12.4.2	No	1		
M 12.18.3	PS9.12.8	Equipment supplied under item 12.4.3	m	100		
	PS9.12.6	Existing VFA Pump Station				
M 12.19	PS9.12.6a	VFA sludge transfer pumps				
M 12.19.1	PS9.12.8	Equipment supplied under item 12.5.1	No	2		
M 12.19.2	PS9.12.8	Equipment supplied under item 12.5.2	No	1		
#REF!						
12 TOTAL CARRIED FORWARD						



ITEM NO	PAYMENT REFERENCE	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BROUGHT FORWARD						
		<u>SECTION 12 :INSTALLATION, TESTING AND COMMISSIONING OF MECHANICAL EQUIPMENT FOR PUMP STATIONS</u>				
M 12.20	PS9.12.6b	Sump Drainage Pump				
M 12.20.1	PS9.12.8	Equipment supplied under item 12.6.1	No	2		
M 12.21	PS9.12.6c	Recycle Fermented Sludge Pumps				
M 12.21.1	PS9.12.8	Equipment supplied under item 12.7.1	No	2		
M 12.21.2	PS9.12.8	Equipment supplied under item 12.7.2	No	1		
M 12.22	PS9.12.6d	Elutriant pumps				
M 12.22.1	PS9.12.8	Equipment supplied under item 12.8.1	No	2		
M 12.22.2	PS9.12.8	Equipment supplied under item 12.8.2	No	1		
	PS9.12.7	New VFA Pump Station				
M 12.23	PS9.12.7a	VFA sludge transfer pumps				
M 12.23.1	PS9.12.8	Equipment supplied under item 12.9.1	No	2		
M 12.23.2	PS9.12.8	Equipment supplied under item 12.9.2	No	1		
M 12.24	PS9.12.7b	Sump drainage pump				
M 12.24.1	PS9.12.8	Equipment supplied under item 12.10.1	No	1		
M 12.25	PS9.12.7c	Recycle Fermented sludge pumps				
M 12.25.1	PS9.12.8	Equipment supplied under item 12.11.1	No	2		
M 12.25.2	PS9.12.8	Equipment supplied under item 12.11.2	No	1		
M 12.26	PS9.12.7d	Thickened sludge digester feed pumps				
M 12.26.1	PS9.12.8	Equipment supplied under item 12.12.1	No	2		
M 12.26.2	PS9.12.8	Equipment supplied under item 12.12.2	No	1		
M 12.27		Lifting Equipment				
M 12.27.1	PS9.12.8	Equipment supplied under item 12.13.1	No	1		
M 12.28		CIVIL WORKS				
M 12.28.1		Grouting and screeding off all aspects of the mechanical installation	sum	1		
12 TOTAL CARRIED TO SUMMARY						



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13		<u>SECTION 13 : DESIGN, SUPPLY AND DELIVERY OF THE MECHANICAL EQUIPMENT FOR ODOUR CONTROL</u>				
M 13.1	PS 13.4	Design, Manufacture and deliver Mechanical equipment for Odour Control. In accordance with the Specification and drawings				
M 13.1.1	PS 13.4	Preparation of design and drawings for approval by the engineer	Sum	1		
M 13.1.2	PS 13.4	Complete Odour treatment plant In accordance with the Specification and drawings.	Sum	1		
M 13.1.3	PS 13.4	Overflow launder odour control covers manufactured in GRP complete with supports and anchors for the new VFA Fermenter In accordance with the Specification and drawings.	Sum	1		
M 13.1.4	PS 13.4	Overflow launder odour control covers manufactured in GRP complete with supports and anchors for the existing VFA Fermenter In accordance with the Specification and drawings.	Sum	1		
M 13.1.5	PS 13.4	New GRP covers to the existing and new mixing chamber In accordance with the Specification and drawings.	No	2		
M 13.1.6	PS 13.4	New GRP covers to the existing sludge transfer channels In accordance with the Specification and drawings.	No	1		
M 13.1.7	PS 13.4	New GRP covers to new sludge transfer sumps In accordance with the Specification and drawings.	No	2		
M 13.1.8	PS 13.4	New GRP covers to new sludge wasting sumps In accordance with the Specification and drawings.	No	1		
M 13.1.9	PS 13.4	Complete odour extraction ducting including fittings, air flow control valves, supports and anchors In accordance with the Specification and drawings.	Sum	1		
M 13.1.10	PS 13.4	Hand held H ₂ S analysers	No	2		
		<u>SECTION 13 : INSTALLATION, TESTING OF THE MECHANICAL EQUIPMENT FOR ODOUR CONTROL</u>				
M 13.2	PS 13.4	Installation Testing and commissioning of mechanical equipment for odour control In accordance with the Specification and drawings				
M 13.2.1	PS 13.4	Equipment supplied under item 13.1.2	No	1		
M 13.2.2	PS 13.4	Equipment supplied under item 13.1.3	No	1		
#REF!						
13 TOTAL CARRIED FORWARD						

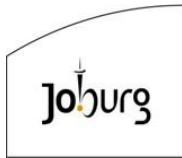


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BROUGHT FORWARD						
		<u>SECTION 13 : INSTALLATION, TESTING OF THE MECHANICAL EQUIPMENT FOR ODOUR CONTROL</u>				
M 13.2.3	PS 13.4	Equipment supplied under item 13.1.4	No	1		
M 13.2.4	PS 13.4	Equipment supplied under item 13.1.5	No	2		
M 13.2.5	PS 13.4	Equipment supplied under item 13.1.6	No	1		
M 13.2.6	PS 13.4	Equipment supplied under item 13.1.7	No	2		
M 13.2.7	PS 13.4	Equipment supplied under item 13.1.8	No	1		
M 13.2.9		Removal of existing covers from sludge transfer channels and delivery to on site storage as indicated by the Engineer or JW site management	Sum	1		
M 13.2.10		Removal of existing covers from mixing tank and delivery to on site storage as indicated by the Engineer or JW site management	Sum	1		
M 13.2.11		Removal of existing odour treatment plant and delivery to on site storage as indicated by the Engineer or JW site management	Sum	1		
M 13.2.12		Removal of existing odour collection pipework and fittings and delivery to on site storage as indicated by the Engineer or JW site management	Sum	1		
M 13.2.13		Provision for duct column supports	Kg	4000		
M 13.2.14		Performance and acceptance test for a 28 day period	Sum	1		
M 13.3		CIVIL WORKS				
M 13.3.1		Grouting and screeding off all aspects of the mechanical installation	sum	1		
M 13.4		Recommended spares	PC sum	1		300 000.00
13 TOTAL CARRIED TO SUMMARY						

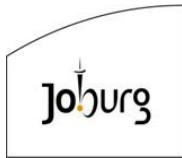
ITEM NO	PAYMENT REFERENCE	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
14		<u>SECTION 14 : DESIGN, SUPPLY AND DELIVERY OF MECHANICAL EQUIPMENT H.O.W. (NORTH)</u>				
M 14.1	PS 9.14.4	Design, Manufacture and Delivery of screening equipment				
M 14.1.1		Trash Rake bar				
M 14.1.1.1	PS 9.14.4	Trash Rake bar screen - in accordance with the specification.	No	2		
M 14.1.1.2	PS 9.14.4	Trash Rake screening mechanism complete - in accordance with the specification and drawings.	No	1		
M 14.1.2.3	PS 9.14.4	Trash Rake screening mechanism monorail and support structure - in accordance with the specification and drawings.	Sum	1		
M 14.1.2.4	PS 9.14.4	Galvanised walk way and access stairs	kg	2500		
M 14.1.2	PS 9.14.4	Primary bar screens				
M 14.1.2.1	PS 9.14.4	Front Raked bar screen complete - in accordance with the specification and drawings.	No	4		
M 14.1.2.2	PS 9.14.4	Screenings chute extension from screen to existing hydro conveyor	No	4		
	PS 9.14.4	Design, Manufacture and Delivery of The Screenings handling Equipment				
M 14.1.3	PS 9.14.4	Primary screenings handling				
M 14.1.3.1	PS 9.14.4	PC sum for modifications to existing hydro-conveyor as approved by the engineer	PC sum	1		R 250 000.00
M 14.1.3.2	PS 9.14.4	Primary Screenings washer / press / compactor complete - in accordance with the specification and drawings.	No	1		
		<u>SECTION 14 : DESIGN, SUPPLY AND DELIVERY OF MECHANICAL EQUIPMENT UNIT SOUTH</u>				
M 14.2	PS 9.14.4	Design, Manufacture and Delivery of screening equipment				
M 14.2.1		Trash Rake bar				
M 14.2.1.1	PS 9.14.4	Trash Rake bar screen - in accordance with the specification and drawings.	No	3		
M 14.2.1.2	PS 9.14.4	Trash Rake screening mechanism complete - in accordance with the specification and drawings.	No	1		
M 14.2.1.3	PS 9.14.4	Trash Rake screening mechanism monorail and support structure - in accordance with the specification and drawings.	Sum	1		
M 14.2.1.4	PS 9.14.4	Galvanised walk way and access stairs	kg	1500		
M 14.2.1.5	PS 9.14.4	Local control panel for the proper operation of the trash rack screening mechanism included cabling from the panel to the screening mechanism, instrumentation, cable racking and all necessary supports to provide a fully operational system	sum	1		
M 14.2.2	PS 9.14.4	Primary bar screens				
M 14.2.2.1	PS 9.14.4	Front Raked bar screen complete - in accordance with the specification and drawings.	No	3		
14	TOTAL CARRIED FORWARD					



Contract JW13897
Northern Wastewater Treatment Works
Expansion of Capacity Unit 5 – Installation of
Mechanical and Electrical Equipment
Volume 1 Tender and Contract
Pricing Data



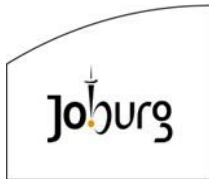
ITEM NO	PAYMENT REFERENCE	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BROUGHT FORWARD						
	PS 9.14.4	Design, Manufacture and Delivery of the Screenings handling Equipment				
M 14.2.2.2	PS 9.14.4	Screenings chute extension from screen to existing hydro conveyor	No	3		
M 14.2.2.3		Inspection if the existing HOW (North) installation for the detailed design of the mechanical equipment to ensure compatability.	Sum	1		
M 14.2.2.4		Inspection if the existing HOW (South) installation for the detailed design of the mechanical equipment to ensure compatability.	Sum	1		
M 14.2.3	PS 9.14.4	Provisional sums				
M 14.2.3.1		Manually operated Dolly for mounting of screenings skip complete - in accordance with the specification.	PC sum	3	R 350 000.00	R 1 050 000.00
M 14.2.3.2		Civil works for dolly rails	PC sum	1		200 000.00
M 14.2.3.3		Civil works for plinths for monorail	PC sum	1		200 000.00
M 14.2.3.4		PC sum for unforeseen modifications to accommodate trash rakes at HOW NORTH	PC sum	1		2 500 000.00
M 14.2.3.5		PC sum for unforeseen modifications to accommodate trash rakes at HOW SOUTH	PC sum	1		2 500 000.00
12	CARRIED FORWARD					



Contract JW13897
Northern Wastewater Treatment Works
Expansion of Capacity Unit 5 – Installation of
Mechanical and Electrical Equipment
Volume 1 Tender and Contract
Pricing Data



ITEM NO	PAYMENT REFERENCE	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BROUGHT FORWARD						
M 14.3		<u>SECTION 14 : INSTALLATION TESTING AND COMMISSIONING OF MECHANICAL EQUIPMENT H.O.W. NORTH</u>				
	PS 9.14.4	Installation, testing and commissioning of screening equipment				
M 14.3.1		Trash Rake bar				
M 14.3.1.1		Trash Rake bar screen - in accordance with the specification and drawings.	No	2		
M 14.3.1.2		Trash Rake screening mechanism complete - in accordance with the specification and drawings.	No	1		
M 14.3.1.3		Trash Rake screening mechanism monorail and support structure - in accordance with the specification and drawings.	Sum	1		
M 14.3.2	PS 9.14.4	Primary bar screens				
M 14.3.2.1		Front Raked bar screen complete - in accordance with the specification and drawings.	No	4		
M 14.3.2.2		Screenings chute extension from screen to existing hydro conveyor	No	4		
M 14.4	PS 9.14.4	<u>SECTION 14 : INSTALLATION TESTING AND COMMISSIONING OF MECHANICAL EQUIPMENT H.O.W. SOUTH</u>				
	PS 9.14.4	Installation, testing and commissioning of screening equipment				
M 14.4.1		Trash Rake bar				
M 14.4.1.1		Trash Rake bar screen - in accordance with the specification and drawings.	No	3		
M 14.4.1.2		Trash Rake screening mechanism complete - in accordance with the specification and drawings.	No	1		
		Trash Rake screening mechanism monorail and support structure - in accordance with the specification and drawings.	Sum	1		
M 14.4.2	PS 9.14.4	Primary bar screens				
M 14.4.2.1		Front Raked bar screen complete - in accordance with the specification and drawings.	No	3		
M 14.4.2.2		Screenings chute extension from screen to existing hydro conveyor	No	3		
14	TOTAL CARRIED TO SUMMARY					



Contract JW13897
Northern Wastewater Treatment Works
Expansion of Capacity Unit 5 – Installation of
Mechanical and Electrical Equipment
Volume 1 Tender and Contract
Pricing Data



SECTION	DESCRIPTION	AMOUNT
BROUGHT FORWARD		
2	AERATORS	
3	MIXERS	
4	MLSS RECIRCULATION PUMPS	
5	RAS RECIRCULATION PUMPS	
6	PRIMARY SETTLEMENT TANKS	
7	SECONDARY SETTLEMENT TANKS	
8	SLUDGE THICKENERS	
9	VFA FERMENTERS	
10	FERRIC DOSING	
11	DISINFECTION DOSING	
12	PUMP STATIONS	
13	ODOUR CONTROL	
14	HEAD OF WORKS	
TOTAL CARRIED TO SUMMARY		

SECTION 4: ELECTRICAL ENGINEERING REQUIREMENTS

ITEM No.	PAYM. REFERS	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
E 2		SUPPLY AND DELIVERY OF ELECTRICAL WORKS				
E 2.1		SUPPLY AND DELIVERY OF NEW MAJOR ELECTRICAL EQUIPMENT				
E 2.1.1		MV SWITCHGEAR AS PER DATASHEETS AND SPECIFICATION				
E 2.1.1.1	PSY2.1.7	Unit 5 Module 2 Bioreactor Substation 11kV Switchgear (Datasheet: JW13898-E-007-1)	Ea.	1		
E 2.1.1.2	PSY2.1.3	Unit 5 Main Intake Substation Incomer Extension to existing Switchgear Actom SBV4/800/25/Si (Datasheet: JW13898-E-007-2)	Ea.	1		
E 2.1.1.3	PSY2.1.7	Unit 5 Module 2 Substation Battery Tripping Unit	Ea.	1		
E 2.1.2		TRANSFORMER AS PER DATASHEETS AND SPECIFICATION				
E 2.1.2.1	PSY2.1.7	630kVA, Dual-Wound, 11-6.6/0.4 kV Step Down Transformer (Datasheet: JW13898-E-013-1)	Ea.	4		
E 2.1.2.2	PSY2.1.3	1600kVA, Dual-Wound, 0.4/6.6-11kV Step Up Transformer (Datasheet: JW13898-E-013-2)	Ea.	1		
E 2.1.2.3	PSY2.1.1	11kV, 20A, 3s Neutral Earthing Resistor for 1600kVA Step Up Transformer	Ea.	1		
E 2.1.3		GENERATORS AS PER DATASHEETS AND SPECIFICATION				
E 2.1.3.1	PSY2.1.3	1600kVA (Prime) Diesel Generator with bulk storage fuel system and all control and interface cables. (Datasheet: JW13898-E-010-1)	Ea.	1		
E 2.1.3.2	PSY2.1.4	315kVA (Prime) Diesel Generator with bulk storage fuel system and all control and interface cables. (Datasheet: JW13898-E-010-2)	Ea.	1		
E 2.1.3.3	PSY2.1.4	Admin Building Changeover Panel - Distribution Board (Datasheet: JW13898-E-007-1)	Ea.	1		
E 2.1.4	PSY2.1.7	BIOREACTOR MOTOR CONTROL CENTRE AS PER DATASHEETS AND SPECIFICATION				
E 2.1.4.1		New Unit 5 Module 2 Bioreactor Motor Control Centre (5E2-MCC-01) (Datasheet: JW13898-E-002-1)	Ea.	1		
E 2.1.4.2		Ventilation fan for the MCC Room (3-phase, 400V, 0.55kW, 2880rpm, with air quantity of 500l/s @ 200pa)	Ea.	2		
TOTAL CARRIED FORWARD						

TOTAL BROUGHT FORWARD					
E 2		SUPPLY AND DELIVERY OF ELECTRICAL WORKS			
E 2.1.5	PSY2.1.5	EQUIP EXISTING BALANCING TANK MOTOR CONTROL CENTRE			
E 2.1.5.1		Equip Existing Balancing Tank and PST MCC with 0.55kW PST Bridge Drive DOL Starter	Ea.	2	
E 2.1.5.2		Equip Existing Balancing Tank and PST MCC with 11kW DOL Starter	Ea.	6	
E 2.1.5.3		Equip Existing Balancing Tank and PST Instrument DB with 6A, 3Pole miniature circuit breaker Valve Feeder	Ea.	2	
E 2.1.6	PSY2.1.10	EQUIP EXISTING WST MOTOR CONTROL CENTRE			
E 2.1.6.1		Equip Existing WST MCC with Thickener Drive 0.55kW DOL Starter	Ea.	1	
E 2.1.6.2		Equip Existing WST Instrument DB with 6A, 3Pole miniature circuit breaker Valve Feeder	Ea.	1	
E 2.1.7	PSY2.1.8	EQUIP EXISTING HYPOCHLORITE MOTOR CONTROL CENTRE			
E 2.1.7.1		Equip Existing Hypochlorite MCC with 0.75kW VSD Starter	Ea.	1	
E 2.1.8	PSY2.1.11	EQUIP EXISTING WAS PUMPSTATION MOTOR CONTROL CENTRE			
E 2.1.8.1		Equip Existing WAS Pump station MCC with 22kW DOL Starter	Ea.	1	
E 2.1.9	PSY2.1.6	NEW AND EXSTING ELUTRIATION/FERMENTATION MOTOR CONTROL CENTRE			
E 2.1.9.1		Equip Existing Elutriation Pump station MCC with 18.5kW DOL Starter	Ea.	3	
E 2.1.9.2		Equip Existing Elutriation Pump station MCC with 5.5kW DOL Starter	Ea.	2	
E 2.1.9.3		Equip Existing Elutriation Pump station MCC with 11kW DOL Starter	Ea.	2	
E 2.1.9.4		Unit 5 New Fermentation Motor Control Centre (Datasheet: JW13898-E-002-1)	Ea.	1	
E 2.1.9.5		Ventilation fan for the MCC Room (3-phase, 400V, 0.55kW, 2880rpm, with air quantity of 500l/s @ 200pa)	Ea.	2	
TOTAL CARRIED FORWARD					

TOTAL BROUGHT FORWARD						
E 2		SUPPLY AND DELIVERY OF ELECTRICAL WORKS				
E 2.1.10	PSY2.1.14	SMALL POWER DISTRIBUTION BOARDS AS PER DATASHEETS AND SPECIFICATION				
E 2.1.10.1		Unit 5 Bioreactor 2 Substation SP&L DB (Datasheet: ING645D-WSP-E-002-2)	Ea.	2		
E 2.1.10.2		Unit 5 Elutriation Pump Station SP&L DB (Datasheet: JW13898-E-002-2)	Ea.	2		
E 2.1.11	PSY2.1.7	INSTRUMENT DISTRIBUTION BOARDS AS PER DATASHEETS AND SPECIFICATION				
E 2.1.11.1		Unit 5 Module 2 Instrument DB (Datasheet: JW13898-E-002-3)	Ea.	1		
E 2.1.11.2		Unit 5 Elutriation Instrument DB (Datasheet: JW13898-E-002-3)	Ea.	1		
E 2.1.12		EQUIPPING EXISTING INSTRUMENT DISTRIBUTION BOARDS AS PER SPECIFICATION				
E 2.1.12.1	PSY2.1.15	Equipping the existing PST and Balancing Tank Instrument DB with 2A, 2-pole miniature circuit breakers	Ea.	5		
E 2.1.12.2	PSY2.1.18	Equipping the existing Hypochlorite Instrument DB with 2A, 2-pole miniature circuit breaker	Ea.	1		
E 2.1.12.3		Equipping the existing Unit 5 Bioreactor 1 Analyser Room Instrument DB with 2A, 2-pole miniature circuit breakers	Ea.	8		
E 2.1.12.3	PSY2.1.9	Equipping the existing Final Effluent Analyser Room Instrument DB with 2A, 2-pole miniature circuit breakers	Ea.	9		
E 2.1.13		ELECTRICAL ISOLATOR PUSHBUTTON STATION (LOCAL START/STOP) EQUIPMENT				
E 2.1.13.1		0.37kW to 30kW (DOL Motor Station) 63A Isolator	Ea.	60		
E 2.1.13.2		37kW to 75kW (DOL Motor Station) 160A Isolator	Ea.	4		
E 2.1.13.2.3		90kW to 110kW (Star-Delta Motor Station) 200A Isolator	Ea.	9		
E 2.2	PSY2.1.13	SUPPLY AND DELIVERY OF EARTHING AND LIGHTNING PROTECTION				
E 2.2.1		Earthing and Lightning Protection for Bioreactor Substation and MCC by specialist	Prov.	Sum		R 500 000.00
E 2.2.2		Earthing and Lightning Protection for New Elutriation Pump station and MCC Room by specialist	Prov.	Sum		R 150 000.00
TOTAL CARRIED FORWARD						

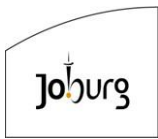
TOTAL BROUGHT FORWARD					
E 4		SUPPLY AND DELIVERY OF ELECTRICAL WORKS			
E 2.3		SUPPLY AND DELIVERY OF SMALL POWER AND LIGHTING EQUIPMENT			
E 2.3.1	PSY2.1.12	AREA LIGHTING			
E 2.3.1.1		High mast pole - 20 meters tall, mid-hinged type, galvanised steel construction (including allowance for supply and installation of concrete plinths). Pole to be designed to support 8 off 400 W LED floodlights. Masts to include DB as per drawing ING0645D-5E2-SM04	Ea.	3	
E 2.3.1.2		400 W LED Floodlight (IP65 ingress protection, wide beam, hail proof, corrosion proof and vandal resistant) complete with mounting accessories, mounted on high mast poles	Ea.	24	
E 2.3.1.3		Provision to move existing Fermentation/Elutriation fixed approximately 25m High Mast	Ea.	1	
E 2.3.2	PSY2.1.12	LUMINAIRES			
E 2.3.2.1		2 x 58W industrial fluorescent with Polycarbonate diffuser and Electronic Control Gear, IP65 ingress protection complete with mounting accessories	Ea.	18	
E 2.3.2.2		2 x 58W industrial fluorescent with Polycarbonate diffuser and Electronic Control Gear and built in emergency back-up - 1hour with 100% light output, IP65 ingress protection complete with mounting accessories	Ea.	4	
E 2.3.2.3		80W High Pressure Sodium Bulk heads, IP65 ingress protection complete with mounting accessories	Ea.	6	
E 2.3.3		CONDUITS AND WIRING			
E 2.3.3.1		25 mm Bosal (Galvanised Steel) conduit (c/w with mounting saddles and mounting accessories for surface mounting)	Ea.	60	
E 2.3.3.2		40 mm Bosal (Galvanised Steel) conduit (c/w with mounting saddles and mounting accessories for surface mounting)	Ea.	20	
E 2.3.3.3		2-way conduit round boxes fitted with 5A socket outlet for luminaire plug tops	Ea.	0	
E 2.3.3.4		3-way conduit round boxes (Galvanised Steel) for 25mm conduit	Ea.	3	
E 2.3.3.5		3-way conduit round boxes for (Galvanised Steel) for 40mm conduit	Ea.	0	
E 2.3.2.6		4mm ² PVC wire to SANS 1411, installed in conduit	m	405	
E 2.3.2.7		2.5mm ² PVC wire to SANS 1411, installed in conduit	m	550	
TOTAL CARRIED FORWARD					

TOTAL BROUGHT FORWARD					
E 2		SUPPLY AND DELIVERY OF ELECTRICAL WORKS			
E 2.3.4		SWITCHES AND SOCKET OUTLETS			
E 2.3.4.1		Surface Mounted 16 A industrial type switch socket outlet	Ea.	4	
E 2.3.4.2		Surface Mounted 63 A welding socket outlet, 5-pin round type, IP44	Ea.	3	
E 2.3.4.3		Surface Mounted 1-way industrial light switch	Ea.	0	
E 2.3.4.4		Surface Mounted 2-way industrial type light switch	Ea.	6	
E 2.3.4.5		Surface Mounted industrial type 16A double pole isolator	Ea.	0	
E 2.4	PSY2.1.15	SUPPLY AND DELIVERY OF XLPE INSULATED, PVC BEDDED, STEEL WIRE ARMoured, PVC SHEATHED 6.35/11kV CABLES TO SANS 1339 TYPE A			
	PSY2.1.7	BIOREACTOR PRIMARY MEDIUM VOLTAGE CABLE			
E 2.4.1		Cable from Bioreactor 1 Substation to Bioreactor 2 Substation			
E 2.4.1.1		Power cable 120mm ² 3-Core XLPE Cable	m	300	
E 2.4.1.2		120mm ² 3-Core Copper Cable terminations	Ea.	4	
E 2.4.1.3		Earth cable 95mm ² Clear Insulated KWENA Cable	m	300	
E 2.4.1.4		95mm ² Clear Insulated KWENA termination kit	Ea.	4	
		UPGRADE OF UNIT 5 MAIN INTAKE SUB FEEDER CABLES			
E 2.4.2	PSY2.1.1	Main Intake Sub to Unit 5 Intake Sub - Incomer CB2			
E 2.4.2.1		Power cable 150mm ² 3-Core XLPE Cable	m	1000	
E 2.4.2.2		150mm ² 3-Core Copper Cable terminations	Ea.	8	
E 2.4.2.3		150mm ² 3-Core Copper Cable splice kits	Ea.	6	
E 2.4.2.4		Earth cable 95mm ² Clear Insulated KWENA Cable	m	1000	
E 2.4.2.5		95mm ² Clear Insulated KWENA termination kit	Ea.	8	
E 2.4.2.6		95mm ² Clear Insulated KWENA splice kits	Ea.	6	
E 2.4.3	PSY2.1.1	Main Intake Sub to Unit 5 Intake Sub - Incomer CB6			
E 2.4.3.1		Power cable 150mm ² 3-Core XLPE Cable	m	1000	
E 2.4.3.2		150mm ² 3-Core Copper Cable terminations	Ea.	8	
E 2.4.3.3		150mm ² 3-Core Copper Cable splice kits	Ea.	14	
E 2.4.3.4		Earth cable 95mm ² Clear Insulated KWENA Cable	m	1000	
E 2.4.3.5		95mm ² Clear Insulated KWENA termination kit	Ea.	8	
E 2.4.3.6		95mm ² Clear Insulated KWENA splice kits	Ea.	14	
TOTAL CARRIED FORWARD					

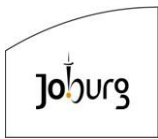
TOTAL BROUGHT FORWARD					
E 2		SUPPLY AND DELIVERY OF ELECTRICAL WORKS			
E 2.4.4		Bioreactor 2 MV Switchgear to Unit 5 Transformer 1			
E 2.4.4.1		Power cable 120mm ² 3-Core XLPE Cable	m	25	
E 2.4.4.2		120mm ² 3-Core Copper Cable terminations	Ea.	2	
E 2.4.4.3		Earth cable 95mm ² Clear Insulated KWENA Cable	m	25	
E 2.4.4.4		95mm ² Clear Insulated KWENA termination kit	Ea.	2	
E 2.4.5		Bioreactor 2 MV Switchgear to Unit 5 Transformer 2			
E 2.4.5.1		Power cable 120mm ² 3-Core XLPE Cable	m	25	
E 2.4.5.2		120mm ² 3-Core Copper Cable terminations	Ea.	2	
E 2.4.5.3		Earth cable 95mm ² Clear Insulated KWENA Cable	m	25	
E 2.4.5.4		95mm ² Clear Insulated KWENA termination kit	Ea.	2	
E 2.4.6		Bioreactor 2 MV Switchgear to Unit 5 Transformer 3			
E 2.4.6.1		Power cable 120mm ² 3-Core XLPE Cable	m	25	
E 2.4.6.2		120mm ² 3-Core Copper Cable terminations	Ea.	2	
E 2.4.6.3		Earth cable 95mm ² Clear Insulated KWENA Cable	m	25	
E 2.4.6.4		95mm ² Clear Insulated KWENA termination kit	Ea.	2	
E 2.4.7		Bioreactor 2 MV Switchgear to Unit 5 Transformer 4			
E 2.4.7.1		Power cable 120mm ² 3-Core XLPE Cable	m	25	
E 2.4.7.2		120mm ² 3-Core Copper Cable terminations	Ea.	2	
E 2.4.7.3		Earth cable 95mm ² Clear Insulated KWENA Cable	m	25	
E 2.4.7.4		95mm ² Clear Insulated KWENA termination kit	Ea.	2	
E 2.5		SUPPLY AND DELIVERY LOW VOLTAGE RESIN ENCAPSULATED BUSBAR ACCORDING TO IEC60431 and IEC 60331-21			
E 2.5.1	PSY2.1.7	Bio-Reactor Busbar trunking from Transformer to MCC	Lot	1	
E 2.5.1.1		1600A, 3ph + N + E copper resin encapsulated busbar trunking system from Bio-Reactor 2 Transformer 1 to Bio- Reactor 2 MCC1	Lot	1	
E 2.5.1.2		1600A, 3ph + N + E copper resin encapsulated busbar trunking system from Bio-Reactor 2 Transformer 2 to Bio- Reactor 2 MCC2	Lot	1	
E 2.5.1.3		1600A, 3ph + N + E copper resin encapsulated busbar trunking system from Bio-Reactor 2 Transformer 3 to Bio- Reactor 2 MCC3	Lot	1	
E 2.5.1.4		1600A, 3ph + N + E copper resin encapsulated busbar trunking system from Bio-Reactor 2 Transformer 4 to Bio- Reactor 2 MCC4	Lot	1	
TOTAL CARRIED FORWARD					

TOTAL BROUGHT FORWARD					
E 4		SUPPLY AND DELIVERY OF ELECTRICAL WORKS			
E 2.6	PSY2.1.15	SUPPLY AND DELIVERY OF PVC INSULATED, PVC BEDDED, STEEL WIRE ARMoured, PVC SHEATHED 600/1000V FLAME RETARDANT (RED STRIPE) CABLES TO SANS 1507-3 AND SANS 60332			
		BALANCING TANK AND PST CABLES			
E 2.6.1		5M6ME07 - PST5 Bridge Drive			
E 2.6.1.1		Power cable	m	135	
E 2.6.1.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.1.3		2.5mm ² 4-Core Copper Cable terminations	m	130	
E 2.6.1.4		Control Cable	Ea.	2	
E 2.6.2		5M6ME08 - PST6 Bridge Drive			
E 2.6.2.1		Power cable	m	95	
E 2.6.2.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.2.3		2.5mm ² 4-Core Copper Cable terminations	m	90	
E 2.6.2.4		Control Cable	Ea.	2	
E 2.6.3		5M7ME10 - Balancing Tank 2 Mixer 1			
E 2.6.3.1		Power cable	m	145	
E 2.6.3.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.3.3		2.5mm ² 4-Core Copper Cable terminations	m	140	
E 2.6.3.4		Control Cable	Ea.	2	
E 2.6.4		5M7ME11 - Balancing Tank 2 Mixer 2			
E 2.6.4.1		Power cable	m	125	
E 2.6.4.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.4.3		2.5mm ² 4-Core Copper Cable terminations	m	120	
E 2.6.4.4		Control Cable	Ea.	2	
E 2.6.5		5M7ME12 - Balancing Tank 2 Mixer 3			
E 2.6.5.1		Power cable	m	125	
E 2.6.5.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.5.3		2.5mm ² 4-Core Copper Cable terminations	m	120	
E 2.6.5.4		Control Cable	Ea.	2	
E 2.6.6		5M7ME13 - Balancing Tank 2 Mixer 4			
E 2.6.6.1		Power cable	m	105	
E 2.6.6.2		6mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.6.3		6mm ² 4-Core Copper Cable terminations	m	100	
E 2.6.6.4		Control Cable	Ea.	2	
TOTAL CARRIED FORWARD					

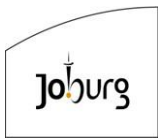
TOTAL BROUGHT FORWARD					
E 2		SUPPLY AND DELIVERY OF ELECTRICAL WORKS			
E 2.6.7		5M7ME14 - Balancing Tank 2 Mixer 5			
E 2.6.7.1		Power cable	m	105	
E 2.6.7.2		6mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.7.3		6mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.7.4		Control Cable	m	100	
E 2.6.7.5		2.5mm ² 12-Core Copper Cable	Ea.	2	
E 2.6.7.6		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.6.8		5M7ME15 - Balancing Tank 2 Mixer 6			
E 2.6.8.1		Power cable	m	85	
E 2.6.8.2		6mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.8.3		6mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.8.4		Control Cable	m	80	
E 2.6.8.5		2.5mm ² 12-Core Copper Cable	Ea.	2	
E 2.6.8.6		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.6.9		5M6ME09 - PST5 Underflow Valve			
E 2.6.9.1		Power cable	m	90	
E 2.6.9.2		2.5mm ² 4-Core Copper Cable	Ea.	2	
E 2.6.9.3		2.5mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.6.10		5M6ME10 - PST6 Underflow Valve			
E 2.6.10.1		Power cable	m	90	
E 2.6.10.2		2.5mm ² 4-Core Copper Cable	Ea.	2	
E 2.6.10.3		2.5mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.6.11		5M7ME16 - Balancing Tank 2 Outlet Sluice Gate			
E 2.6.11.1		Power cable	m	160	
E 2.6.11.2		2.5mm ² 4-Core Copper Cable	Ea.	2	
E 2.6.11.3		2.5mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.6.12		5M7ME17 - Balancing Tank 2 Inlet Sluice Gate			
E 2.6.12.1		Power cable	m	160	
E 2.6.12.2		2.5mm ² 4-Core Copper Cable	Ea.	2	
E 2.6.12.3		2.5mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.6.13		5M8ME08 - Effluent Pump 01			
E 2.6.13.1		Power cable	m	40	
E 2.6.13.2		10mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.13.3		10mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.13.4		Control Cable	m	35	
E 2.6.13.5		2.5mm ² 12-Core Copper Cable	Ea.	2	
E 2.6.13.6		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.6.14		5M8ME09 - Effluent Pump 02			
E 2.6.14.1		Power cable	m	40	
E 2.6.14.2		10mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.14.3		10mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.14.4		Control Cable	m	35	
E 2.6.14.5		2.5mm ² 12-Core Copper Cable	Ea.	2	
E 2.6.14.6		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
PSY2.1.6		ELUTRIATION CABLES			
E 2.6.13		5M8ME08 - Effluent Pump 01			
E 2.6.13.1		Power cable	m	40	
E 2.6.13.2		10mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.13.3		10mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.13.4		Control Cable	m	35	
E 2.6.13.5		2.5mm ² 12-Core Copper Cable	Ea.	2	
E 2.6.13.6		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.6.14		5M8ME09 - Effluent Pump 02			
E 2.6.14.1		Power cable	m	40	
E 2.6.14.2		10mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.14.3		10mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.14.4		Control Cable	m	35	
E 2.6.14.5		2.5mm ² 12-Core Copper Cable	Ea.	2	
E 2.6.14.6		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
TOTAL CARRIED FORWARD					



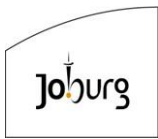
TOTAL BROUGHT FORWARD					
E 2		SUPPLY AND DELIVERY OF ELECTRICAL WORKS			
E 2.6.15		5M8ME19 - Effluent Pump 03			
E 2.6.15.1		Power cable	m	35	
E 2.6.15.2		10mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.15.3		10mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.15.4		Control Cable	m	30	
E 2.6.15.5		2.5mm ² 12-Core Copper Cable	m	30	
E 2.6.15.6		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.6.16		5M8ME05 - Sludge Recycle Pump 01			
E 2.6.16.1		Power cable	m	35	
E 2.6.16.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.16.3		2.5mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.16.4		Control Cable	m	30	
E 2.6.16.5		2.5mm ² 12-Core Copper Cable	m	30	
E 2.6.16.6		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.6.17		5M8ME06 - Sludge Recycle Pump 02			
E 2.6.17.1		Power cable	m	35	
E 2.6.17.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.17.3		2.5mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.17.4		Control Cable	m	30	
E 2.6.17.5		2.5mm ² 12-Core Copper Cable	m	30	
E 2.6.17.6		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.6.18		5M8ME07 - Transfer Pump 01			
E 2.6.18.1		Power cable	m	30	
E 2.6.18.2		4mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.18.3		4mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.18.4		Control Cable	m	25	
E 2.6.18.5		2.5mm ² 12-Core Copper Cable	m	25	
E 2.6.18.6		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.6.19		5M8ME08 - Transfer Pump 02			
E 2.6.19.1		Power cable	m	30	
E 2.6.19.2		4mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.19.3		4mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.19.4		Control Cable	m	25	
E 2.6.19.5		2.5mm ² 12-Core Copper Cable	m	25	
E 2.6.19.6		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.6.20		5M8ME17 - Thickener 2 Bridge Drive			
E 2.6.20.1		Power cable	m	60	
E 2.6.20.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.20.3		2.5mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.20.4		Control Cable	m	55	
E 2.6.20.5		2.5mm ² 12-Core Copper Cable	m	55	
E 2.6.20.6		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.6.21		5M8ME18 - Elutriation Mixer			
E 2.6.21.1		Power cable	m	40	
E 2.6.21.2		10mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.21.3		10mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.21.4		Control Cable	m	35	
E 2.6.21.5		2.5mm ² 12-Core Copper Cable	m	35	
E 2.6.21.6		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
TOTAL CARRIED FORWARD					



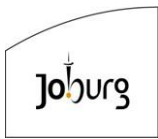
TOTAL BROUGHT FORWARD					
E 2		SUPPLY AND DELIVERY OF ELECTRICAL WORKS			
E 2.6.22		5M8ME24 - Effluent Pump 04			
E 2.6.22.1		Power cable	m	40	
E 2.6.22.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.22.3		Control Cable	m	35	
E 2.6.22.4		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.6.23		5M8ME25 - Effluent Pump 05			
E 2.6.23.1		Power cable	m	40	
E 2.6.23.2		2.5mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.23.3		Control Cable	m	35	
E 2.6.23.4		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.6.24		5M8ME26 - Effluent Pump 06			
E 2.6.24.1		Power cable	m	35	
E 2.6.24.2		2.5mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.24.3		Control Cable	m	30	
E 2.6.24.4		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.6.25		5M8ME20 - Sludge Recycle Pump 03			
E 2.6.25.1		Power cable	m	30	
E 2.6.25.2		2.5mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.25.3		Control Cable	m	25	
E 2.6.25.4		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.6.26		5M8ME201- Sludge Recycle Pump 04			
E 2.6.26.1		Power cable	m	30	
E 2.6.26.2		2.5mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.26.3		Control Cable	m	25	
E 2.6.26.4		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.6.27		5M8ME22 - Transfer Pump 03			
E 2.6.27.1		Power cable	m	30	
E 2.6.27.2		2.5mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.27.3		Control Cable	m	25	
E 2.6.27.4		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.6.28		5M8ME23 - Transfer Pump 04			
E 2.6.28.1		Power cable	m	20	
E 2.6.28.2		2.5mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.28.3		Control Cable	m	15	
E 2.6.28.4		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
TOTAL CARRIED FORWARD					



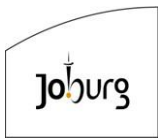
TOTAL BROUGHT FORWARD					
E 2		SUPPLY AND DELIVERY OF ELECTRICAL WORKS			
E 2.6.29		5M8ME28 - Sump Pump			
E 2.6.29.1		Power cable	m	25	
E 2.6.29.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.29.3		Control Cable	m	20	
E 2.6.29.4		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.6.30		5M8ME - Elutriation Instrument DB			
E 2.6.30.1		Power cable	m	20	
E 2.6.30.2		2.5mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.6.30.3		Earth cable	m	20	
E 2.6.30.4		16mm ² Clear Insulated KWENA Cable	Ea.	2	
E 2.6.31		5M8ME - Elutriation SP&L DB			
E 2.6.31.1		Power cable	m	20	
E 2.6.31.2		25mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.6.31.3		Earth cable	m	20	
E 2.6.31.4		16mm ² Clear Insulated KWENA termination kit	Ea.	2	
E 2.6.32		5M8MCC02 - Elutriation MCC Supply Cable			
E 2.6.32.1		Power cable	m	65	
E 2.6.32.2		95mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.6.32.3		Earth cable	m	65	
E 2.6.32.4		95mm ² Clear Insulated KWENA termination kit	Ea.	2	
E 2.6.33		5M8ME29 - Sludge Recirculation Valve			
E 2.6.33.1		Power cable	m	160	
E 2.6.33.2		2.5mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.6.34		5M8ME01 - Odour Control Recirculating Pump			
E 2.6.34.1		Power cable	m	105	
E 2.6.34.2		2.5mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.34.3		Control Cable	m	100	
E 2.6.34.4		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.6.35		5M8ME02 - Odour Control Effluent Pump			
E 2.6.35.1		Power cable	m	105	
E 2.6.35.2		2.5mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.35.3		Control Cable	m	100	
E 2.6.35.4		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
TOTAL CARRIED FORWARD					



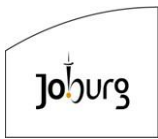
TOTAL BROUGHT FORWARD					
E 2		SUPPLY AND DELIVERY OF ELECTRICAL WORKS			
E 2.6.36		5M8ME03 - Odour Control Blower			
E 2.6.36.1		Power cable	m	105	
E 2.6.36.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.36.3		2.5mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.36.4		Control Cable	m	100	
E 2.6.37		2.5mm ² 12-Core Copper Cable	Ea.	2	
E 2.6.37.1		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.6.37.2		5M8ME04 - Odour Control Nutrient solution Mixer			
E 2.6.37.3		Power cable	m	105	
E 2.6.37.4		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.38		2.5mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.38.1		Control Cable	m	100	
E 2.6.38.2		2.5mm ² 12-Core Copper Cable	Ea.	2	
E 2.6.38.3		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.6.38.4		5M2ME01 - Mixer 1			
E 2.6.39		Power cable	m	95	
E 2.6.39.1		10mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.39.2		10mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.39.3		Control Cable	m	90	
E 2.6.39.4		2.5mm ² 12-Core Copper Cable	Ea.	2	
E 2.6.40		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.6.41		5M2ME05 - Mixer 5			
E 2.6.41.1		Power cable	m	125	
E 2.6.41.2		10mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.41.3		10mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.41.4		Control Cable	m	120	
E 2.6.41.5		2.5mm ² 12-Core Copper Cable	Ea.	2	
E 2.6.41.6		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.6.42		5M2ME09 - Mixer 9			
E 2.6.42.1		Power cable	m	160	
E 2.6.42.2		25mm ² 4-Core Copper Cable	Ea.	2	
E 2.6.42.3		25mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.6.42.4		Power cable (from S/S Station to Motor)	m	5	
E 2.6.42.5		10mm ² 4-Core Copper Cable	Ea.	2	
E 2.6.42.6		10mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.6.42.7		Control Cable	m	160	
E 2.6.42.8		2.5mm ² 12-Core Copper Cable	Ea.	2	
E 2.6.42.9		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.6.43		5M2ME10 - Aerator 1			
E 2.6.43.1		Power cable	m	580	
E 2.6.43.2		150mm ² 4-Core Aluminium Cable	Ea.	8	
E 2.6.43.3		150mm ² 4-Core Aluminium Cable terminations	Ea.	8	
E 2.6.43.4		Power cable (from S/S Station to Motor)	m	20	
E 2.6.43.5		95mm ² 4-Core Aluminium Cable	Ea.	8	
E 2.6.43.6		95mm ² 4-Core Aluminium Cable terminations	Ea.	8	
TOTAL CARRIED FORWARD					



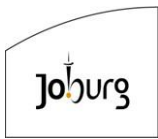
TOTAL BROUGHT FORWARD					
E 2		SUPPLY AND DELIVERY OF ELECTRICAL WORKS			
E 2.6.41.5		Control Cable	m	145	
E 2.6.41.6		2.5mm ² 19-Core Copper Cable			
		2.5mm ² 19-Core Copper Cable terminations	Ea.	2	
E 2.6.42		5M2ME14 - Aerator 5			
E 2.6.42.1		Power cable	m	740	
E 2.6.42.2		95mm ² 4-Core Aluminium Cable			
		95mm ² 4-Core Aluminium Cable terminations	Ea.	16	
E 2.6.42.3		Control Cable	m	180	
E 2.6.42.4		2.5mm ² 19-Core Copper Cable			
		2.5mm ² 19-Core Copper Cable terminations	Ea.	2	
E 2.6.43		5M2ME10 - Aerator 9			
E 2.6.43.1		Power cable	m	860	
E 2.6.43.2		150mm ² 4-Core Aluminium Cable			
		150mm ² 4-Core Aluminium Cable terminations	Ea.	8	
E 2.6.43.3		Power cable (from S/S Station to Motor)	m	20	
E 2.6.43.4		95mm ² 4-Core Aluminium Cable			
		95mm ² 4-Core Aluminium Cable terminations	Ea.	8	
E 2.6.43.5		Control Cable	m	215	
E 2.6.43.6		2.5mm ² 19-Core Copper Cable			
		2.5mm ² 19-Core Copper Cable terminations	Ea.	2	
E 2.6.44		5M2ME24 - Mixed Liquor Pump 1			
E 2.6.44.1		Power cable	m	80	
E 2.6.44.2		2.5mm ² 4-Core Copper Cable			
		2.5mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.44.3		Control Cable	m	75	
E 2.6.44.4		2.5mm ² 12-Core Copper Cable			
		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.6.45		5M2ME28 - Clarifier 1 Bridge Drive			
E 2.6.45.1		Power cable	m	345	
E 2.6.45.2		2.5mm ² 4-Core Copper Cable			
		2.5mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.45.3		Control Cable	m	340	
E 2.6.45.4		2.5mm ² 12-Core Copper Cable			
		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.6.46		5M2ME02 - Mixer 2			
E 2.6.46.1		Power cable	m	80	
E 2.6.46.2		10mm ² 4-Core Copper Cable			
		10mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.46.3		Control Cable	m	75	
E 2.6.46.4		2.5mm ² 12-Core Copper Cable			
		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.6.47		5M2ME02 - Mixer 6			
E 2.6.47.1		Power cable	m	110	
E 2.6.47.2		10mm ² 4-Core Copper Cable			
		10mm ² 4-Core Copper Cable terminations	Ea.	4	
TOTAL CARRIED FORWARD					



TOTAL BROUGHT FORWARD					
E 2		SUPPLY AND DELIVERY OF ELECTRICAL WORKS			
E 2.6.47.3		Control Cable	m	105	
E 2.6.47.4		2.5mm ² 12-Core Copper Cable			
E 2.6.47.4		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.6.48		5M2ME11 - Aerator 2			
E 2.6.48.1		Power cable	m	620	
E 2.6.48.2		120mm ² 4-Core Aluminium Cable			
E 2.6.48.2		120mm ² 4-Core Aluminium Cable terminations	Ea.	4	
E 2.6.48.3		Power cable (from S/S Station to Motor)	m	20	
E 2.6.48.3		95mm ² 4-Core Aluminium Cable			
E 2.6.48.4		95mm ² 4-Core Aluminium Cable terminations	Ea.	4	
E 2.6.48.5		Control Cable	m	160	
E 2.6.48.5		2.5mm ² 19-Core Copper Cable			
E 2.6.48.6		2.5mm ² 19-Core Copper Cable terminations	Ea.	2	
E 2.6.49		5M2ME15 - Aerator 6			
E 2.6.49.1		Power cable	m	780	
E 2.6.49.2		150mm ² 4-Core Aluminium Cable			
E 2.6.49.2		150mm ² 4-Core Aluminium Cable terminations	Ea.	4	
E 2.6.49.3		Power cable (from S/S Station to Motor)	m	20	
E 2.6.49.3		95mm ² 4-Core Aluminium Cable			
E 2.6.49.4		95mm ² 4-Core Aluminium Cable terminations	Ea.	4	
E 2.6.49.5		Control Cable	m	195	
E 2.6.49.5		2.5mm ² 19-Core Copper Cable			
E 2.6.49.6		2.5mm ² 19-Core Copper Cable terminations	Ea.	2	
E 2.6.50		5M2ME19 - Mixer 10			
E 2.6.50.1		Power cable	m	225	
E 2.6.50.2		70mm ² 4-Core Aluminium Cable			
E 2.6.50.2		70mm ² 4-Core Aluminium Cable terminations	Ea.	2	
E 2.6.50.3		Power cable (from S/S Station to Motor)	m	5	
E 2.6.50.3		25mm ² 4-Core Aluminium Cable			
E 2.6.50.4		25mm ² 4-Core Aluminium Cable terminations	Ea.	2	
E 2.6.50.5		Control Cable	m	225	
E 2.6.50.5		2.5mm ² 19-Core Copper Cable			
E 2.6.50.6		2.5mm ² 19-Core Copper Cable terminations	Ea.	2	
E 2.6.51		5M2ME19 - Mixer 10			
E 2.6.51.1		Power cable	m	225	
E 2.6.51.2		70mm ² 4-Core Aluminium Cable			
E 2.6.51.2		70mm ² 4-Core Aluminium Cable terminations	Ea.	2	
E 2.6.51.3		Power cable (from S/S Station to Motor)	m	5	
E 2.6.51.3		25mm ² 4-Core Aluminium Cable			
E 2.6.51.4		25mm ² 4-Core Aluminium Cable terminations	Ea.	2	
E 2.6.51.5		Control Cable	m	225	
E 2.6.51.5		2.5mm ² 19-Core Copper Cable			
E 2.6.51.6		2.5mm ² 19-Core Copper Cable terminations	Ea.	2	
E 2.6.52		5M2ME20 - Aerator 10			
E 2.6.52.1		Power cable	m	1000	
E 2.6.52.2		95mm ² 4-Core Aluminium Cable			
E 2.6.52.2		95mm ² 4-Core Aluminium Cable terminations	Ea.	8	
E 2.6.52.3		Control Cable	m	245	
E 2.6.52.3		2.5mm ² 19-Core Copper Cable			
E 2.6.52.4		2.5mm ² 19-Core Copper Cable terminations	Ea.	2	
TOTAL CARRIED FORWARD					



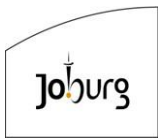
TOTAL BROUGHT FORWARD					
E 2		SUPPLY AND DELIVERY OF ELECTRICAL WORKS			
E 2.6.53		5M2ME23 - Aerator 13			
E 2.6.53.1		Power cable	m	240	
E 2.6.53.2		120mm ² 4-Core Aluminium Cable	Ea.	2	
E 2.6.53.3		Power cable (from S/S Station to Motor)	m	5	
E 2.6.53.4		50mm ² 4-Core Aluminium Cable terminations	Ea.	2	
E 2.6.53.5		Control Cable	m	240	
E 2.6.53.6		2.5mm ² 12-Core Copper Cable	Ea.	2	
E 2.6.54		5M2ME25 - Mixed Liquor Pump 2			
E 2.6.54.1		Power cable	m	85	
E 2.6.54.2		95mm ² 4-Core Aluminium Cable	Ea.	4	
E 2.6.54.3		95mm ² 4-Core Aluminium Cable terminations	m	80	
E 2.6.54.4		Control Cable	Ea.	2	
E 2.6.55		5M2ME29 - Clarifier 2 Bridge Drive			
E 2.6.55.1		Power cable	m	365	
E 2.6.55.2		4mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.55.3		4mm ² 4-Core Copper Cable terminations	m	360	
E 2.6.55.4		Control Cable	Ea.	2	
E 2.6.56		5M2ME03 - Mixer 3			
E 2.6.56.1		Power cable	m	95	
E 2.6.56.2		10mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.56.3		10mm ² 4-Core Copper Cable terminations	m	90	
E 2.6.56.4		Control Cable	Ea.	2	
E 2.6.57		5M2ME07 - Mixer 7			
E 2.6.57.1		Power cable	m	135	
E 2.6.57.2		16mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.57.3		16mm ² 4-Core Copper Cable terminations	m	130	
E 2.6.57.4		Control Cable	Ea.	2	
E 2.6.58		5M2ME15 - Aerator 3			
E 2.6.58.1		Power cable	m	700	
E 2.6.58.2		150mm ² 4-Core Aluminium Cable	Ea.	8	
E 2.6.58.3		150mm ² 4-Core Aluminium Cable terminations	m	20	
E 2.6.58.4		Power cable (from S/S Station to Motor)	Ea.	8	
E 2.6.58.5		95mm ² 4-Core Aluminium Cable	m	175	
E 2.6.58.6		95mm ² 4-Core Aluminium Cable terminations	Ea.	2	
E 2.6.58.7		Control Cable			
E 2.6.58.8		2.5mm ² 19-Core Copper Cable			
E 2.6.58.9		2.5mm ² 19-Core Copper Cable terminations			
TOTAL CARRIED FORWARD					



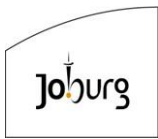
TOTAL BROUGHT FORWARD					
E 4		SUPPLY AND DELIVERY OF ELECTRICAL WORKS			
E 2.6.59		5M2ME21 - Aerator 11			
E 2.6.59.1		Power cable	m	260	
E 2.6.59.2		120mm ² 4-Core Aluminium Cable	Ea.	2	
E 2.6.59.3		Power cable (from S/S Station to Motor)	m	5	
E 2.6.59.4		50mm ² 4-Core Aluminium Cable	Ea.	2	
E 2.6.59.5		Control Cable	m	260	
E 2.6.59.6		2.5mm ² 19-Core Copper Cable	Ea.	2	
E 2.6.60		5M2ME26 - Mixed Liquor Pump 3			
E 2.6.60.1		Power cable	m	455	
E 2.6.60.2		70mm ² 4-Core Copper Cable	Ea.	6	
E 2.6.60.3		Control Cable	m	225	
E 2.6.60.4		2.5mm ² 12-Core Copper Cable	Ea.	2	
E 2.6.61		5M2ME30 - Clarifier 3 Bridge Drive			
E 2.6.61.1		Power cable	m	385	
E 2.6.61.2		4mm ² 4-Core Copper Cable	Ea.	2	
E 2.6.61.3		Control Cable	m	380	
E 2.6.61.4		2.5mm ² 12-Core Copper Cable	Ea.	2	
E 2.6.62		5M2ME31 - Screw Pump 1			
E 2.6.62.1		Power cable	m	555	
E 2.6.62.2		70mm ² 4-Core Aluminium Cable	Ea.	6	
E 2.6.62.3		Control Cable	m	275	
E 2.6.62.4		2.5mm ² 12-Core Copper Cable	Ea.	2	
E 2.6.63		5M2ME35 - Screw 1 Grease Pump			
E 2.6.63.1		Power cable	m	275	
E 2.6.63.2		10mm ² 3-Core Aluminium Cable	Ea.	2	
E 2.6.63.3		Power cable	m	5	
E 2.6.63.4		4mm ² 3-Core Aluminium Cable	Ea.	2	
E 2.6.64		5M2ME34 - Effluent Sample Pump 1			
E 2.6.64.1		Power cable	m	105	
E 2.6.64.2		4mm ² 4-Core Aluminium Cable	Ea.	4	
E 2.6.64.3		Control Cable	m	100	
E 2.6.64.4		2.5mm ² 12-Core Copper Cable	Ea.	2	
TOTAL CARRIED FORWARD					

TOTAL BROUGHT FORWARD					
E 4		SUPPLY AND DELIVERY OF ELECTRICAL WORKS			
E 2.6.65		5M1ME40 - Chemical Dosing Pump 3			
E 2.6.65.1		Power cable	m	280	
E 2.6.65.2		2.5mm ² 4-Core Aluminium Cable	Ea.	4	
E 2.6.65.3		Control Cable	m	275	
E 2.6.65.4		2.5mm ² 12-Core Copper Cable	Ea.	2	
E 2.6.66		5M2ME04 - Mixer 4			
E 2.6.66.1		Power cable	m	110	
E 2.6.66.2		16mm ² 4-Core Copper Cable	Ea.	2	
E 2.6.66.3		Power cable (from S/S Station to Motor)	m	5	
E 2.6.66.4		6mm ² 4-Core Copper Cable	Ea.	2	
E 2.6.66.5		Control Cable	m	110	
E 2.6.66.6		2.5mm ² 12-Core Copper Cable	Ea.	2	
E 2.6.67		5M2ME08 - Mixer 8			
E 2.6.67.1		Power cable	m	145	
E 2.6.67.2		25mm ² 4-Core Aluminium Cable	Ea.	2	
E 2.6.67.3		Power cable (from S/S Station to Motor)	m	5	
E 2.6.67.4		10mm ² 4-Core Aluminium Cable	Ea.	2	
E 2.6.67.5		Control Cable	m	140	
E 2.6.67.6		2.5mm ² 12-Core Copper Cable	Ea.	2	
E 2.6.68		5M2ME13 - Aerator 4			
E 2.6.68.1		Power cable	m	800	
E 2.6.68.2		150mm ² 4-Core Aluminium Cable	Ea.	8	
E 2.6.68.3		Power cable (from S/S Station to Motor)	m	20	
E 2.6.68.4		95mm ² 4-Core Aluminium Cable	Ea.	8	
E 2.6.68.5		Control Cable	m	200	
E 2.6.68.6		2.5mm ² 19-Core Copper Cable	Ea.	2	
E 2.6.69		5M2ME13 - Aerator 8			
E 2.6.69.1		Power cable	m	960	
E 2.6.69.2		185mm ² 4-Core Aluminium Cable	Ea.	8	
E 2.6.69.3		Power cable (from S/S Station to Motor)	m	20	
E 2.6.69.4		120mm ² 4-Core Aluminium Cable	Ea.	8	
E 2.6.69.5		Control Cable	m	235	
E 2.6.69.6		2.5mm ² 19-Core Copper Cable	Ea.	2	
TOTAL CARRIED FORWARD					

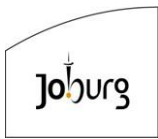
TOTAL BROUGHT FORWARD					
E 2		SUPPLY AND DELIVERY OF ELECTRICAL WORKS			
E 2.6.70		5M2ME22 - Aerator 12			
E 2.6.70.1		Power cable	m	255	
E 2.6.70.2		150mm ² 4-Core Aluminium Cable	Ea.	4	
E 2.6.70.3		Power cable (from S/S Station to Motor)	m	20	
E 2.6.70.4		50mm ² 4-Core Aluminium Cable terminations	Ea.	4	
E 2.6.70.5		Control Cable	m	255	
E 2.6.70.6		2.5mm ² 19-Core Copper Cable	Ea.	2	
E 2.6.71		5M2ME27 - Mixed Liquor Pump 4			
E 2.6.71.1		Power cable	m	460	
E 2.6.71.2		70mm ² 4-Core Aluminium Cable	Ea.	4	
E 2.6.71.3		Power cable (from S/S Station to Motor)	m	5	
E 2.6.71.4		50mm ² 4-Core Aluminium Cable terminations	Ea.	2	
E 2.6.71.5		Control Cable	m	230	
E 2.6.71.6		2.5mm ² 12-Core Copper Cable	Ea.	2	
E 2.6.72		5M2ME32 - Screw Pump 2			
E 2.6.72.1		Power cable	m	555	
E 2.6.72.2		70mm ² 4-Core Aluminium Cable	Ea.	6	
E 2.6.72.3		Control Cable	m	275	
E 2.6.72.4		2.5mm ² 12-Core Copper Cable	Ea.	2	
E 2.6.73		5M2ME36 - Screw 2 Grease Pump			
E 2.6.73.1		Power cable	m	275	
E 2.6.73.2		10mm ² 3-Core Aluminium Cable	Ea.	2	
E 2.6.73.3		Power cable	m	5	
E 2.6.73.4		4mm ² 3-Core Aluminium Cable terminations	Ea.	2	
E 2.6.74		5M2ME33 - WAS Flow Control Valve			
E 2.6.74.1		Power cable	m	100	
E 2.6.74.2		2.5mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.6.75		PLC80			
E 2.6.75.1		Power cable	m	20	
E 2.6.75.2		10mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.6.75.3		Power cable	m	20	
E 2.6.75.4		6mm ² Clear Insulated KWENA Cable termination	Ea.	2	
TOTAL CARRIED FORWARD					



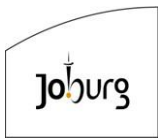
TOTAL BROUGHT FORWARD					
E 4		SUPPLY AND DELIVERY OF ELECTRICAL WORKS			
E 2.6.76		Instrument DB			
E 2.6.76.1		Power cable	m	20	
E 2.6.76.2		10mm ² 4-Core Copper Cable	Ea.	2	
E 2.6.76.3		10mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.6.76.4		Earth cable	m	20	
E 2.6.76.5		10mm ² Clear Insulated KWENA Cable	Ea.	2	
E 2.6.76.6		10mm ² Clear Insulated KWENA Cable terminations	Ea.	2	
E 2.6.77		Bio-Reactor MCC SP&L DB			
E 2.6.77.1		Power cable	m	20	
E 2.6.77.2		16mm ² 4-Core Copper Cable	Ea.	2	
E 2.6.77.3		16mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.6.77.4		Earth cable	m	20	
E 2.6.77.5		10mm ² Clear Insulated KWENA Cable	Ea.	2	
E 2.6.77.6		10mm ² Clear Insulated KWENA Cable terminations	Ea.	2	
E 2.6.78	PSY2.1.12	High Mast Light 01			
E 2.6.78.1		Power cable	m	120	
E 2.6.78.2		10mm ² 4-Core Copper Cable	Ea.	2	
E 2.6.78.3		10mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.6.78.4		Earth cable	m	120	
E 2.6.78.5		10mm ² Clear Insulated KWENA Cable	Ea.	2	
E 2.6.78.6		10mm ² Clear Insulated KWENA Cable terminations	Ea.	2	
E 2.6.79	PSY2.1.12	High Mast Light 02			
E 2.6.79.1		Power cable	m	240	
E 2.6.79.2		10mm ² 4-Core Copper Cable	Ea.	2	
E 2.6.79.3		10mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.6.79.4		Earth cable	m	240	
E 2.6.79.5		10mm ² Clear Insulated KWENA Cable	Ea.	2	
E 2.6.79.6		10mm ² Clear Insulated KWENA Cable terminations	Ea.	2	
E 2.6.80	PSY2.1.12	High Mast Light 03			
E 2.6.80.1		Power cable	m	360	
E 2.6.80.2		10mm ² 4-Core Copper Cable	Ea.	2	
E 2.6.80.3		10mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.6.80.4		Earth cable	m	360	
E 2.6.80.5		10mm ² Clear Insulated KWENA Cable	Ea.	2	
E 2.6.80.6		10mm ² Clear Insulated KWENA Cable terminations	Ea.	2	
E 2.6.81	PSY2.1.8	<u>HYPOCHLORITE CABLES</u>			
E 2.6.81.1		5M5ME03 - Chemical Dosing Pump3			
E 2.6.81.2		Power cable	m	50	
E 2.6.81.3		2.5mm ² 4-Core Copper Cable	Ea.	2	
E 2.6.81.4		2.5mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.6.81.5		Control Cable	m	50	
E 2.6.81.6		2.5mm ² 19-Core Copper Cable	Ea.	2	
E 2.6.81.7		2.5mm ² 19-Core Copper Cable terminations	Ea.	2	
TOTAL CARRIED FORWARD					



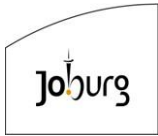
TOTAL BROUGHT FORWARD					
E 4		SUPPLY AND DELIVERY OF ELECTRICAL WORKS			
	PSY2.1.10	WASTE SLUDGE THICKENER			
E 2.6.82		5M9ME11 - WST2 Thickener Drive			
E 2.6.82.1		Power cable	m	305	
E 2.6.82.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.82.3		2.5mm ² 4-Core Copper Cable terminations	m	300	
E 2.6.82.4		Control Cable	m	300	
E 2.6.82.5		2.5mm ² 12-Core Copper Cable	Ea.	2	
E 2.6.82.6		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.6.83		5M9ME10 - WST2 Underflow Valve			
E 2.6.83.1		Power cable	m	300	
E 2.6.83.2		2.5mm ² 4-Core Copper Cable	Ea.	2	
E 2.6.83.3		2.5mm ² 4-Core Copper Cable terminations	Ea.	2	
	PSY2.1.10	WAS PUMPSTATION CABLES			
E 2.6.84		5M9ME09 - WAS Pump 3			
E 2.6.84.1		Power cable	m	45	
E 2.6.84.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.84.3		2.5mm ² 4-Core Copper Cable terminations	m	40	
E 2.6.84.4		Control Cable	m	40	
E 2.6.84.5		2.5mm ² 12-Core Copper Cable	Ea.	2	
E 2.6.84.6		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
		VENTILATION FAN CABLES			
E 2.6.85		Ventilation Fan 01			
E 2.6.85.1		Power cable	m	20	
E 2.6.85.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.85.3		2.5mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.86		Ventilation Fan 02			
E 2.6.86.1		Power cable	m	20	
E 2.6.86.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.86.3		2.5mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.87		Ventilation Fan 03			
E 2.6.87.1		Power cable	m	30	
E 2.6.87.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.87.3		2.5mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.6.88		Ventilation Fan 04			
E 2.6.88.1		Power cable	m	20	
E 2.6.88.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.6.88.3		2.5mm ² 4-Core Copper Cable terminations	Ea.	4	
TOTAL CARRIED FORWARD					



TOTAL BROUGHT FORWARD					
E 2		SUPPLY AND DELIVERY OF ELECTRICAL WORKS			
E 2.7	PSY2.1.16	SUPPLY AND DELIVERY OF ORANGE POWDER COATED 304 STAINLESS STEEL HEAVY DUTY CABLE LADDER, COMPLETE WITH UNISTRUT SUPPORT BRACKETS AND FIXING MATERIALS			
E 2.7.1		1000mm wide cable ladder - straight	m	700	
E 2.7.2		1000mm wide cable ladder - elbow	Ea.	56	
E 2.7.3		1000mm wide cable ladder - dropper / riser	Ea.	11	
E 2.7.4		1000mm cable ladder covers	m	55	
E 2.7.5		800mm wide cable ladder - straight	m	20	
E 2.7.6		800mm wide cable ladder - elbow	Ea.	0	
E 2.7.7		800mm wide cable ladder - dropper / riser	Ea.	2	
E 2.7.8		800mm wide cable ladder covers	m	10	
E 2.7.9		600mm wide cable ladder - straight	m	300	
E 2.7.10		600mm wide cable ladder - elbow	Ea.	12	
E 2.7.11		600mm wide cable ladder - dropper / riser	Ea.	6	
E 2.7.12		600mm wide cable ladder covers	m	15	
E 2.7.13		200mm wide cable ladder - straight	m	30	
E 2.7.14		200mm wide cable ladder - elbow	Ea.	3	
E 2.7.15		200mm wide cable ladder - dropper / riser	Ea.	1	
E 2.7.16		200mm wide cable ladder covers	m	10	
E 2.7.17		150mm wide cable ladder - straight	m	20	
E 2.7.18		150mm wide cable ladder - elbow	Ea.	2	
E 2.7.19		150mm wide cable ladder - dropper / riser	Ea.	3	
E 2.7.20		150mm wide cable ladder covers	m	10	
TOTAL CARRIED FORWARD					



TOTAL BROUGHT FORWARD					
E 2		SUPPLY AND DELIVERY OF ELECTRICAL WORKS			
E 2.8	PSY2.1.16	ORANGE PIGMENTED GLASS REINFORCED POLYESTER CABLE LADDER, COMPLETE WITH 316 STAINLESS STEEL SUPPORT BRACKETS AND FIXING MATERIALS, MOUNTED ON BUILDING WALLS OR OTHER STEEL STRUCTURES			
E 2.8.1		150mm wide cable ladder - straight	m	10	
E 2.8.2		150mm wide cable ladder - elbow	Ea.	2	
E 2.8.3		150mm wide cable ladder - dropper / riser	Ea.	1	
E 2.8.4		150mm wide cable ladder covers	m	10	
E 2.9		SUPPLY AND DELIVERY OF TRENCH: EXCAVATION AND BACKFILLING OF CABLE TRENCHES, PIPE CROSSINGS AND ROAD CROSSINGS			
E 2.9.1		Trench and backfill 300mm wide x 500mm deep with one layer of protective tiles and warning tape as per Electrical Medium and Low Voltage Cable installation specification.	m	300	
E 2.9.2		Trench and backfill 150mm wide x 500mm deep with one layer of protective tiles and warning tape as per Electrical Medium and Low Voltage Cable installation specification..	m	320	
E 2.9.3		Excavate and backfill Road Crossings, including installation of sleeves. (Road Paving by others) as per Electrical Medium and Low Voltage Cable installation specification.	Ea.	2	
E 2.9.4		Cable Route Marker Posts as per specification.	Prov.	Sum	
TOTAL CARRIED FORWARD					



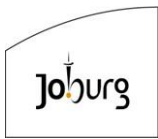
TOTAL BROUGHT FORWARD					
E 2		SUPPLY AND DELIVERY OF ELECTRICAL WORKS			
E 2.1		SUNDRIES			
E 2.11.1		Substation signage as per the requirements of Electrical Machinery Regulation No.4 of the Occupational Health & Safety Act of SA	Prov.	Sum	
E 2.11.2		A0 Frames for mounting drawings in sub-station.	Ea.	1	
E 2.11		COMMISSIONING			
E 2.11.1		Commissioning Spares	Prov.	Sum	
E 2.11.2		Commissioning Assistance	Hours	40	
E 2.12		DOCUMENTATION CERTIFICATES, MANUALS AND QA			
E 2.12.1		Certificate of Compliance	Prov.	Sum	
E 2.12.2		QA documentation for all equipment supplied	Prov.	Sum	
TOTAL CARRIED FORWARD					

TOTAL BROUGHT FORWARD					
E 2		INSTALLATION, TESTING AND COMMISSIONING OF ELECTRICAL WORKS			
E 2.13		INSTALLATION, TESTING AND COMMISSIONING OF NEW MAJOR ELECTRICAL EQUIPMENT			
E 2.13.1		MV SWITCHGEAR AS PER DATASHEET			
E 2.13.1.1	PSY2.1.7	Unit 5 Module 2 Bioreactor Substation 11kV Switchgear (Datasheet: JW13898-E-007-1)	Ea.	1	
E 2.13.1.2	PSY2.1.3	Unit 5 Main Intake Substation Incomer Extension cubicle to existing Switchgear Actom SBV4/800/25/Si (Datasheet: JW13898-E-007-2)	Ea.	1	
E 2.13.1.3	PSY2.1.7	Unit 5 Module 2 Substation Battery Tripping Unit	Ea.	1	
E 2.13.2		TRANSFORMER AS PER DATASHEET			
E 2.13.2.1	PSY2.1.3	1600kVA, Dual-Wound, 0.4/6.6-11kV Step Up Transformer (Datasheet: JW13898-E-013-2)	Ea.	1	
E 2.13.2.2	PSY2.1.7	630kVA, Dual-Wound, 11-6.6/0.4 kV Step Down Transformer (Datasheet: JW13898-E-013-1)	Ea.	4	
E 2.13.2.3	PSY2.1.1	11kV, 20A, 3s Neutral Earthing Resistor for 1600kVA Step Up Transformer	Ea.	1	
E 2.13.3		GENERATORS AS PER DATASHEETS AND SPECIFICATION			
E 2.13.3.1	PSY2.1.2	1600kVA (Prime) Diesel Generator with bulk storage fuel system and all control and interface cables. (Datasheet: JW13898-E-010-1)	Ea.	1	
E 2.13.3.2	PSY2.1.4	315kVA (Prime) Diesel Generator with bulk storage fuel system and all control and interface cables. (Datasheet: JW13898-E-010-2)	Ea.	1	
E 2.13.3.1.2	PSY2.1.4	Admin Building Changeover Panel - Distribution Board (Datasheet: JW13898-E-007-1)	Ea.	1	
E 2.13.4	PSY2.1.7	BIOREACTOR MOTOR CONTROL CENTRE AS PER DATASHEETS AND SPECIFICATION			
E 2.13.4.1		New Unit 5 Module 2 Bioreactor Motor Control Centre (5E2-MCC-01) (Datasheet: JW13898-E-002-1)	Ea.	1	
E 2.13.4.2		Ventilation fan for the MCC Room (3-phase, 400V, 0.55kW, 2880rpm, with air quantity of 500l/s @ 200pa)	Ea.	2	
TOTAL CARRIED FORWARD					

TOTAL BROUGHT FORWARD					
E 2		INSTALLATION, TESTING AND COMMISSIONING OF ELECTRICAL WORKS			
E 2.13.5	PSY2.1.5	EQUIP EXISTING BALANCING TANK MOTOR CONTROL CENTRE			
E 2.13.5.1		Equip Existing Balancing Tank and PST MCC with 0.55kW PST Bridge Drive DOL Starter	Ea.	2	
E 2.13.5.2		Equip Existing Balancing Tank and PST MCC with 11kW DOL Starter	Ea.	6	
E 2.13.5.3		Equip Existing Balancing Tank and PST Instrument DB with 6A, 3Pole miniature circuit breaker Valve Feeder	Ea.	2	
E 2.13.6	PSY2.1.10	EQUIP EXISTING WST MOTOR CONTROL CENTRE			
E 2.13.6.1		Equip Existing WST MCC with Thickener Drive 0.55kW DOL Starter	Ea.	1	
E 2.13.6.2		Equip Existing WST Instrument DB with 6A, 3Pole miniature circuit breaker Valve Feeder	Ea.	1	
E 2.13.7	PSY2.1.8	EQUIP EXISTING HYPOCHLORITE MOTOR CONTROL CENTRE			
E 2.13.7.1		Equip Existing Hypochlorite MCC with 0.75kW VSD Starter	Ea.	1	
E 2.13.8	PSY2.1.11	EQUIP EXISTING WAS PUMPSTATION MOTOR CONTROL CENTRE			
E 2.13.8.1		Equip Existing WAS Pump station MCC with 22kW DOL Starter	Ea.	1	
E 2.13.9	PSY2.1.6	NEW AND EXSTING ELUTRIATION/FERMENTATION MOTOR CONTROL CENTRE			
E 2.13.9.1		Equip Existing Elutriation Pump station MCC with 18.5kW DOL Starter	Ea.	3	
E 2.13.9.2		Equip Existing Elutriation Pump station MCC with 5.5kW DOL Starter	Ea.	2	
E 2.13.9.3		Equip Existing Elutriation Pump station MCC with 11kW DOL Starter	Ea.	2	
E 2.13.9.4		Unit 5 New Fermentation Motor Control Centre (Datasheet: JW13898-E-002-1)	Ea.	1	
E 2.13.9.5		Ventilation fan for the MCC Room (3-phase, 400V, 0.55kW, 2880rpm, with air quantity of 500l/s @ 200pa)	Ea.	2	
TOTAL CARRIED FORWARD					

TOTAL BROUGHT FORWARD						
E 2		INSTALLATION, TESTING AND COMMISSIONING OF ELECTRICAL WORKS				
E 2.13.10	PSY2.1.14	SMALL POWER DISTRIBUTION BOARDS AS PER DATASHEET				
E 2.13.10.1		Unit 5 Module 2 SP&L DB (Datasheet: JW13898-E-002-2)	Ea.	1		
E 2.13.10.2		Unit 5 Elutriation Pump Station SP&L DB (Datasheet: JW13898-E-002-2)	Ea.	1		
E 2.13.11		INSTRUMENT DISTRIBUTION BOARDS AS PER DATASHEET				
E 2.13.11.1		Unit 5 Bioreactor 2 Instrument DB (Datasheet: JW13898-E-002-3)	Ea.	1		
E 2.13.11.2		Unit 5 Elutriation Pump Station Instrument DB (Datasheet: JW13898-E-002-3)	Ea.	1		
E 2.13.12	PSY2.1.7	EQUIPING EXISTING INSTRUMENT DISTRIBUTION BOARDS AS PER SPECIFICATION				
E 2.13.12.1		Equipping the existing PST and Balancing Tank Instrument DB with 2A, 2pole miniature circuit breakers	Ea.	5		
E 2.13.12.2		Equipping the existing Hypochlorite Instrument DB with 2A, 2pole miniature circuit breaker	Ea.	1		
E 2.13.12.3		Equipping the existing Unit 5 Bioreactor 1 Analyser Room Instrument DB with 2A, 2pole miniature circuit breakers	Ea.	8		
E 2.13.12.3		Equipping the existing Final Effluent Analyser Room Instrument DB with 2A, 2pole miniature circuit breakers	Ea.	9		
E 2.13.13		ELECTRICAL ISOLATOR PUSHBUTTON STATION (LOCAL START/STOP) EQUIPMENT				
E 2.13.13.1		0.37kW to 30kW (DOL Motor Station) 63A Isolator	Ea.	60		
E 2.13.13.2		37kW to 75kW (DOL Motor Station) 160A Isolator	Ea.	4		
E 2.13.13.3		90kW to 110kW (Star-Delta Motor Station) 200A Isolator	Ea.	9		
E 2.14	PSY2.1.13	EARTHING AND LIGHTNING PROTECTION				
E 2.14.1		Earthing and Lightning Protection for Bioreactor Substation and MCC by specialist	Prov.	Sum		R 500 000.00
E 2.14.2		Earthing and Lightning Protection for New Elutriation Pump station and MCC Room by specialist	Prov.	Sum		R 150 000.00
TOTAL CARRIED FORWARD						

TOTAL BROUGHT FORWARD					
E 2		INSTALLATION, TESTING AND COMMISSIONING OF ELECTRICAL WORKS			
E 2.15		INSTALLATION, TESTING AND COMMISSIONING OF SMALL POWER AND LIGHTING			
E 2.15.1	PSY2.1.12	AREA LIGHTING			
E 2.15.1.1		High mast pole - 20 meters tall, mid-hinged type, galvanised steel construction (including allowance for supply and installation of concrete plinths). Pole to be designed to support 8 off 400 W LED floodlights. Masts to include DB as per drawing ING0645D-5E2-SM04	Ea.	3	
E 2.15.1.2		400 W LED Floodlight (IP65 ingress protection, wide beam, hail proof, corrosion proof and vandal resistant) complete with mounting accessories, mounted on high mast poles	Ea.	24	
E 2.15.1.3		Provision to move existing Fermentation/Elutriation fixed approximately 25m High Mast	Ea.	1	
E 2.15.2		LUMINAIRES			
E 2.15.2.1		2 x 58W industrial fluorescent with Polycarbonate diffuser and Electronic Control Gear, IP65 ingress protection complete with mounting accessories	Ea.	18	
E 2.15.2.2		2 x 58W industrial fluorescent with Polycarbonate diffuser and Electronic Control Gear and built in emergency back-up - 1hour with 100% light output, IP65 ingress protection complete with mounting accessories	Ea.	4	
E 2.15.2.3		80W High Pressure Sodium Bulk heads, IP65 ingress protection complete with mounting accessories	Ea.	6	
E 2.15.3		CONDUITS AND WIRING			
E 2.15.3.1		25 mm Bosal (Galvanised Steel) conduit (c/w with mounting saddles and mounting accessories for surface mounting)	Ea.	90	
E 2.15.3.2		40 mm Bosal (Galvanised Steel) conduit (c/w with mounting saddles and mounting accessories for surface mounting)	Ea.	30	
E 2.15.3.3		2-way conduit round boxes fitted with 5A socket outlet for luminaire plug tops	Ea.	0	
E 2.15.2.4		3-way conduit round boxes (Galvanised Steel) for 25mm conduit	Ea.	6	
E 2.15.3.5		3-way conduit round boxes for (Galvanised Steel) for 40mm conduit	Ea.	0	
E 2.15.3.6		4mm ² PVC wire to SANS 1411, installed in conduit	m	420	
TOTAL CARRIED FORWARD					



TOTAL BROUGHT FORWARD						
E 2		INSTALLATION, TESTING AND COMMISSIONING OF ELECTRICAL WORKS				
E 2.15.3.7		2.5mm² PVC wire to SANS 1411, installed in conduit	m	600		
E 2.15.4		SWITCHES AND SOCKET OUTLETS				
E 2.15.4.1		Surface Mounted 16 A industrial type switch socket outlet	Ea.	6		
E 2.15.4.2		Surface Mounted 63 A welding socket outlet, 5-pin round type, IP44	Ea.	4		
E 2.15.4.3		Surface Mounted 1-way industrial light switch	Ea.	1		
E 2.15.4.4		Surface Mounted 2-way industrial type light switch	Ea.	6		
E 2.15.4.5		Surface Mounted industrial type 16A double pole isolator	Ea.	0		
TOTAL BROUGHT FORWARD						

TOTAL BROUGHT FORWARD					
E 2		INSTALLATION, TESTING AND COMMISSIONING OF ELECTRICAL WORKS			
E 2.16	PSY2.1.15	INSTALLATION, TESTING AND COMMISSIONING OF XLPE INSULATED, PVC BEDDED, STEEL WIRE ARMoured, PVC SHEATHED 6.35/11kV CABLES TO SANS 1339 TYPE A			
	PSY2.1.7	BIOREACTOR PRIMARY MEDIUM VOLTAGE CABLE			
E 2.16.1		Cable from Bioreactor 1 Substation to Bioreactor 2 Substation			
E 2.16.1.1		Power cable 120mm ² 3-Core XLPE Cable	m	300	
E 2.16.1.2		120mm ² 3-Core Copper Cable terminations	Ea.	4	
E 2.16.1.3		Earth cable 95mm ² Clear Insulated KWENA Cable	m	300	
E 2.16.1.4		95mm ² Clear Insulated KWENA termination kit	Ea.	4	
	PSY2.1.1	UPGRADE OF UNIT 5 MAIN INTAKE SUB FEEDER CABLES			
E 2.16.2		Main Intake Sub to Unit 5 Intake Sub - Incomer CB2			
E 2.16.2.1		Power cable 150mm ² 3-Core XLPE Cable	m	1000	
E 2.16.2.2		150mm ² 3-Core Copper Cable terminations	Ea.	8	
E 2.16.2.3		150mm ² 3-Core Copper Cable splice kits	Ea.	6	
E 2.16.2.4		Earth cable 95mm ² Clear Insulated KWENA Cable	m	1000	
E 2.16.2.5		95mm ² Clear Insulated KWENA termination kit	Ea.	8	
E 2.16.2.6		95mm ² Clear Insulated KWENA splice kits	Ea.	6	
E 2.16.3		Main Intake Sub to Unit 5 Intake Sub - Incomer CB6			
E 2.16.3.1		Power cable 150mm ² 3-Core XLPE Cable	m	1000	
E 2.16.3.2		150mm ² 3-Core Copper Cable terminations	Ea.	8	
E 2.16.3.3		150mm ² 3-Core Copper Cable splice kits	Ea.	14	
E 2.16.3.4		Earth cable 95mm ² Clear Insulated KWENA Cable	m	1000	
E 2.16.3.5		95mm ² Clear Insulated KWENA termination kit	Ea.	8	
E 2.16.3.6		95mm ² Clear Insulated KWENA splice kits	Ea.	14	
E 2.16.4		Bioreactor 2 MV Switchgear to Unit 5 Transformer 1			
E 2.16.4.1		Power cable 120mm ² 3-Core XLPE Cable	m	25	
E 2.16.4.2		120mm ² 3-Core Copper Cable terminations	Ea.	2	
E 2.16.4.3		Earth cable 95mm ² Clear Insulated KWENA Cable	m	25	
E 2.16.4.4		95mm ² Clear Insulated KWENA termination kit	Ea.	2	
TOTAL BROUGHT FORWARD					

TOTAL BROUGHT FORWARD					
E 2		INSTALLATION, TESTING AND COMMISSIONING OF ELECTRICAL WORKS			
E 2.16.5		Bioreactor 2 MV Switchgear to Unit 5 Transformer 2			
E 2.16.5.1		Power cable 120mm ² 3-Core XLPE Cable	m	25	
E 2.16.5.2		120mm ² 3-Core Copper Cable terminations	Ea.	2	
E 2.16.5.3		Earth cable 95mm ² Clear Insulated KWENA Cable	m	25	
E 2.16.5.4		95mm ² Clear Insulated KWENA termination kit	Ea.	2	
E 2.16.6		Bioreactor 2 MV Switchgear to Unit 5 Transformer 3			
E 2.16.6.1		Power cable 120mm ² 3-Core XLPE Cable	m	25	
E 2.16.6.2		120mm ² 3-Core Copper Cable terminations	Ea.	2	
E 2.16.6.3		Earth cable 95mm ² Clear Insulated KWENA Cable	m	25	
E 2.16.6.4		95mm ² Clear Insulated KWENA termination kit	Ea.	2	
E 2.16.7		Bioreactor 2 MV Switchgear to Unit 5 Transformer 4			
E 2.16.7.1		Power cable 120mm ² 3-Core XLPE Cable	m	25	
E 2.16.7.2		120mm ² 3-Core Copper Cable terminations	Ea.	2	
E 2.16.7.3		Earth cable 95mm ² Clear Insulated KWENA Cable	m	25	
E 2.16.7.4		95mm ² Clear Insulated KWENA termination kit	Ea.	2	
E 2.17	PSY2.1.3	INSTALLATION, TESTING AND COMMISSIONING OF LOW VOLTAGE RESIN ENCAPSULATED BUSBAR ACCORDING TO IEC60431 and IEC 60331-21			
E 2.17.1		Bio-Reactor Busbar trunking from Transformer to MCC	Lot	1	
E 2.17.1.1		1600A, 3ph + N + E copper resin encapsulated busbar trunking system from Bio-Reactor 2 Transformer 1 to Bio-Reactor 2 MCC1	Lot	1	
E 2.17.1.2		1600A, 3ph + N + E copper resin encapsulated busbar trunking system from Bio-Reactor 2 Transformer 2 to Bio-Reactor 2 MCC2	Lot	1	
E 2.17.1.3		1600A, 3ph + N + E copper resin encapsulated busbar trunking system from Bio-Reactor 2 Transformer 3 to Bio-Reactor 2 MCC3	Lot	1	
E 2.17.1.4		1600A, 3ph + N + E copper resin encapsulated busbar trunking system from Bio-Reactor 2 Transformer 4 to Bio-Reactor 2 MCC4	Lot	1	
TOTAL CARRIED FORWARD					

TOTAL BROUGHT FORWARD					
E 2		INSTALLATION, TESTING AND COMMISSIONING OF ELECTRICAL WORKS			
E 2.18		INSTALLATION, TESTING AND COMMISSIONING OF PVC INSULATED, PVC BEDDED, STEEL WIRE ARMoured, PVC SHEATHED 600/1000V FLAME RETARDANT (RED STRIPE) CABLES TO SANS 1507-3 AND SANS 60332			
		BALANCING AND PRIMARY SETTLING TANK CABLES			
E 2.18.1		5M6ME07 - PST5 Bridge Drive			
E 2.18.1.1		Power cable	m	135	
E 2.18.1.2		2.5mm² 4-Core Copper Cable	Ea.	4	
E 2.18.1.3		Control Cable	m	130	
E 2.18.1.4		2.5mm² 12-Core Copper Cable	Ea.	2	
E 2.18.2		5M6ME08 - PST6 Bridge Drive			
E 2.18.2.1		Power cable	m	95	
E 2.18.2.2		2.5mm² 4-Core Copper Cable	Ea.	4	
E 2.18.2.3		Control Cable	m	90	
E 2.18.2.4		2.5mm² 12-Core Copper Cable	Ea.	2	
E 2.18.3		5M7ME10 - Balancing Tank 2 Mixer 1			
E 2.18.3.1		Power cable	m	145	
E 2.18.3.2		2.5mm² 4-Core Copper Cable	Ea.	4	
E 2.18.3.3		Control Cable	m	140	
E 2.18.3.4		2.5mm² 12-Core Copper Cable	Ea.	2	
E 2.18.4		5M7ME11 - Balancing Tank 2 Mixer 2			
E 2.18.4.1		Power cable	m	125	
E 2.18.4.2		2.5mm² 4-Core Copper Cable	Ea.	4	
E 2.18.4.3		Control Cable	m	120	
E 2.18.4.4		2.5mm² 12-Core Copper Cable	Ea.	2	
E 2.18.5		5M7ME12 - Balancing Tank 2 Mixer 3			
E 2.18.5.1		Power cable	m	125	
E 2.18.5.2		2.5mm² 4-Core Copper Cable	Ea.	4	
E 2.18.5.3		Control Cable	m	120	
E 2.18.5.4		2.5mm² 12-Core Copper Cable	Ea.	2	
E 2.18.6		5M7ME13 - Balancing Tank 2 Mixer 4			
E 2.18.6.1		Power cable	m	105	
E 2.18.6.2		6mm² 4-Core Copper Cable	Ea.	4	
TOTAL CARRIED FORWARD					

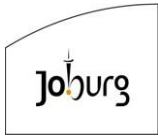
TOTAL BROUGHT FORWARD					
E 4		INSTALLATION, TESTING AND COMMISSIONING OF ELECTRICAL WORKS			
E 2.18.6.3		Control Cable	m	100	
E 2.18.6.4		2.5mm ² 12-Core Copper Cable			
E 2.18.6.4		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.18.7		5M7ME14 - Balancing Tank 2 Mixer 5			
E 2.18.7.1		Power cable	m	105	
E 2.18.7.2		6mm ² 4-Core Copper Cable			
E 2.18.7.2		6mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.18.7.3		Control Cable	m	100	
E 2.18.7.4		2.5mm ² 12-Core Copper Cable			
E 2.18.7.4		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.18.8		5M7ME15 - Balancing Tank 2 Mixer 6			
E 2.18.8.1		Power cable	m	85	
E 2.18.8.2		6mm ² 4-Core Copper Cable			
E 2.18.8.2		6mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.18.8.3		Control Cable	m	80	
E 2.18.8.4		2.5mm ² 12-Core Copper Cable			
E 2.18.8.4		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.18.9		5M6ME09 - PST5 Underflow Valve			
E 2.18.9.1		Power cable	m	90	
E 2.18.9.2		2.5mm ² 4-Core Copper Cable			
E 2.18.9.2		2.5mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.18.10		5M6ME10 - PST6 Underflow Valve			
E 2.18.10.1		Power cable	m	90	
E 2.18.10.2		2.5mm ² 4-Core Copper Cable			
E 2.18.10.2		2.5mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.18.11		5M7ME16 - Balancing Tank 2 Outlet Sluice Gate			
E 2.18.11.1		Power cable	m	160	
E 2.18.11.2		2.5mm ² 4-Core Copper Cable			
E 2.18.11.2		2.5mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.18.12		5M7ME17 - Balancing Tank 2 Inlet Sluice Gate			
E 2.18.12.1		Power cable	m	160	
E 2.18.12.2		2.5mm ² 4-Core Copper Cable			
E 2.18.12.2		2.5mm ² 4-Core Copper Cable terminations	Ea.	2	
	PSY2.1.6	ELUTRIATION CABLES			
E 2.18.13		5M8ME08 - Effluent Pump 01			
E 2.18.13.1		Power cable	m	40	
E 2.18.13.2		10mm ² 4-Core Copper Cable			
E 2.18.13.2		10mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.18.13.3		Control Cable	m	35	
E 2.18.13.4		2.5mm ² 12-Core Copper Cable			
E 2.18.13.4		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
TOTAL CARRIED FORWARD					

TOTAL BROUGHT FORWARD					
E 2		INSTALLATION, TESTING AND COMMISSIONING OF ELECTRICAL WORKS			
E 2.18.14		5M8ME09 - Effluent Pump 02			
E 2.18.14.1		Power cable	m	40	
E 2.18.14.2		10mm ² 4-Core Copper Cable	Ea.	4	
E 2.18.14.3		10mm ² 4-Core Copper Cable terminations	m	35	
E 2.18.14.4		Control Cable	Ea.	2	
E 2.18.15		5M8ME19 - Effluent Pump 03			
E 2.18.15.1		Power cable	m	35	
E 2.18.15.2		10mm ² 4-Core Copper Cable	Ea.	4	
E 2.18.15.3		10mm ² 4-Core Copper Cable terminations	m	30	
E 2.18.15.4		Control Cable	Ea.	2	
E 2.18.16		5M8ME05 - Sludge Recycle Pump 01			
E 2.18.16.1		Power cable	m	35	
E 2.18.16.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.18.16.3		2.5mm ² 4-Core Copper Cable terminations	m	30	
E 2.18.16.4		Control Cable	Ea.	2	
E 2.18.17		5M8ME06 - Sludge Recycle Pump 02			
E 2.18.17.1		Power cable	m	35	
E 2.18.17.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.18.17.3		2.5mm ² 4-Core Copper Cable terminations	m	30	
E 2.18.17.4		Control Cable	Ea.	2	
E 2.18.18		5M8ME07 - Transfer Pump 01			
E 2.18.18.1		Power cable	m	30	
E 2.18.18.2		4mm ² 4-Core Copper Cable	Ea.	4	
E 2.18.18.3		4mm ² 4-Core Copper Cable terminations	m	25	
E 2.18.18.4		Control Cable	Ea.	2	
E 2.18.19		5M8ME08 - Transfer Pump 02			
E 2.18.19.1		Power cable	m	30	
E 2.18.19.2		4mm ² 4-Core Copper Cable	Ea.	4	
E 2.18.19.3		4mm ² 4-Core Copper Cable terminations	m	25	
E 2.18.19.4		Control Cable	Ea.	2	
E 2.18.20		5M8ME17 - Thickener 2 Bridge Drive			
E 2.18.20.1		Power cable	m	60	
E 2.18.20.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
		2.5mm ² 4-Core Copper Cable terminations			
TOTAL CARRIED FORWARD					

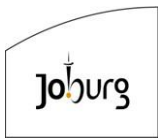
TOTAL BROUGHT FORWARD					
E 2		INSTALLATION, TESTING AND COMMISSIONING OF ELECTRICAL WORKS			
E 2.18.20.3		Control Cable	m	55	
E 2.18.20.4		2.5mm ² 12-Core Copper Cable			
E 2.18.20.4		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.18.21		5M8ME18 - Elutriation Mixer			
E 2.18.21.1		Power cable	m	40	
E 2.18.21.2		10mm ² 4-Core Copper Cable			
E 2.18.21.2		10mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.18.21.3		Control Cable	m	35	
E 2.18.21.4		2.5mm ² 12-Core Copper Cable			
E 2.18.21.4		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.18.22		5M8ME24 - Effluent Pump 04			
E 2.18.22.1		Power cable	m	40	
E 2.18.22.2		2.5mm ² 4-Core Copper Cable			
E 2.18.22.2		2.5mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.18.22.3		Control Cable	m	35	
E 2.18.22.4		2.5mm ² 12-Core Copper Cable			
E 2.18.22.4		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.18.23		5M8ME25 - Effluent Pump 05			
E 2.18.23.1		Power cable	m	40	
E 2.18.23.2		2.5mm ² 4-Core Copper Cable			
E 2.18.23.2		2.5mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.18.23.3		Control Cable	m	35	
E 2.18.23.4		2.5mm ² 12-Core Copper Cable			
E 2.18.23.4		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.18.24		5M8ME26 - Effluent Pump 06			
E 2.18.24.1		Power cable	m	35	
E 2.18.24.2		2.5mm ² 4-Core Copper Cable			
E 2.18.24.2		2.5mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.18.24.3		Control Cable	m	30	
E 2.18.24.4		2.5mm ² 12-Core Copper Cable			
E 2.18.24.4		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.18.25		5M8ME20 - Sludge Recycle Pump 03			
E 2.18.25.1		Power cable	m	30	
E 2.18.25.2		2.5mm ² 4-Core Copper Cable			
E 2.18.25.2		2.5mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.18.25.3		Control Cable	m	25	
E 2.18.25.4		2.5mm ² 12-Core Copper Cable			
E 2.18.25.4		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.18.26		5M8ME201- Sludge Recycle Pump 04			
E 2.18.26.1		Power cable	m	30	
E 2.18.26.2		2.5mm ² 4-Core Copper Cable			
E 2.18.26.2		2.5mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.18.26.3		Control Cable	m	25	
E 2.18.26.4		2.5mm ² 12-Core Copper Cable			
E 2.18.26.4		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
TOTAL CARRIED FORWARD					

TOTAL BROUGHT FORWARD					
E 2		INSTALLATION, TESTING AND COMMISSIONING OF ELECTRICAL WORKS			
E 2.18.27		5M8ME22 - Transfer Pump 03			
E 2.18.27.1		Power cable	m	30	
E 2.18.27.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.18.27.3		2.5mm ² 4-Core Copper Cable terminations	m	25	
E 2.18.27.4		Control Cable	Ea.	2	
E 2.18.28		5M8ME23 - Transfer Pump 04			
E 2.18.28.1		Power cable	m	20	
E 2.18.28.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.18.28.3		2.5mm ² 4-Core Copper Cable terminations	m	15	
E 2.18.28.4		Control Cable	Ea.	2	
E 2.18.29		5M8ME28 - Sump Pump			
E 2.18.29.1		Power cable	m	25	
E 2.18.29.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.18.29.3		2.5mm ² 4-Core Copper Cable terminations	m	20	
E 2.18.29.4		Control Cable	Ea.	2	
E 2.18.30		5M8ME - Elutriation Instrument DB			
E 2.18.30.1		Power cable	m	20	
E 2.18.30.2		2.5mm ² 4-Core Copper Cable	Ea.	2	
E 2.18.30.3		2.5mm ² 4-Core Copper Cable terminations	m	20	
E 2.18.30.4		Earth cable	Ea.	2	
E 2.18.31		5M8ME - Elutriation SP&L DB			
E 2.18.31.1		16mm ² Clear Insulated KWENA Cable	m	20	
E 2.18.31.2		16mm ² Clear Insulated KWENA termination kit	Ea.	2	
E 2.18.31.3		Power cable	m	20	
E 2.18.31.4		25mm ² 4-Core Copper Cable	Ea.	2	
E 2.18.32		5M8MCC02 - Elutriation MCC Supply Cable			
E 2.18.32.1		25mm ² 4-Core Copper Cable terminations	m	20	
E 2.18.32.2		Earth cable	Ea.	2	
E 2.18.32.3		16mm ² Clear Insulated KWENA Cable	m	65	
E 2.18.32.4		16mm ² Clear Insulated KWENA termination kit	Ea.	2	
E 2.18.33		5M8ME29 - Sludge Recirculation Valve			
E 2.18.33.1		Power cable	m	160	
E 2.18.33.2		2.5mm ² 4-Core Copper Cable	Ea.	2	
TOTAL CARRIED FORWARD					

TOTAL BROUGHT FORWARD					
E 2		INSTALLATION, TESTING AND COMMISSIONING OF ELECTRICAL WORKS			
E 2.18.34		5M8ME18 - Sludge Recirculation Pump 5			
E 2.18.34.1		Power cable	m	30	
E 2.18.34.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.18.34.3		2.5mm ² 4-Core Copper Cable terminations	m	25	
E 2.18.34.4		Control Cable	Ea.	2	
E 2.18.35		5M8ME01 - Odour Control Recirculating Pump			
E 2.18.35.1		Power cable	m	105	
E 2.18.35.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.18.35.3		2.5mm ² 4-Core Copper Cable terminations	m	100	
E 2.18.35.4		Control Cable	Ea.	2	
E 2.18.36		5M8ME02 - Odour Control Effluent Pump			
E 2.18.36.1		Power cable	m	105	
E 2.18.36.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.18.36.3		2.5mm ² 4-Core Copper Cable terminations	m	100	
E 2.18.36.4		Control Cable	Ea.	2	
E 2.18.37		5M8ME03 - Odour Control Blower			
E 2.18.37.1		Power cable	m	105	
E 2.18.37.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.18.37.3		2.5mm ² 4-Core Copper Cable terminations	m	100	
E 2.18.37.4		Control Cable	Ea.	2	
E 2.18.38		5M8ME04 - Odour Control Nutrient solution Mixer			
E 2.18.38.1		Power cable	m	105	
E 2.18.38.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.18.38.3		2.5mm ² 4-Core Copper Cable terminations	m	100	
E 2.18.38.4		Control Cable	Ea.	2	
PSY2.1.7		MODULE 2 BIOREACTOR LV CABLES			
E 2.18.39		5M2ME01 - Mixer 1			
E 2.18.39.1		Power cable	m	95	
E 2.18.39.2		10mm ² 4-Core Copper Cable	Ea.	4	
E 2.18.39.3		10mm ² 4-Core Copper Cable terminations	m	90	
E 2.18.39.4		Control Cable	Ea.	2	
		2.5mm ² 12-Core Copper Cable			
		2.5mm ² 12-Core Copper Cable terminations			
TOTAL CARRIED FORWARD					

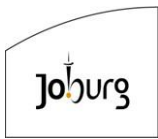


TOTAL BROUGHT FORWARD					
E 2		INSTALLATION, TESTING AND COMMISSIONING OF ELECTRICAL WORKS			
E 2.18.40		5M2ME05 - Mixer 5			
E 2.18.40.1		Power cable	m	125	
E 2.18.40.2		10mm ² 4-Core Copper Cable	Ea.	4	
E 2.18.40.3		10mm ² 4-Core Copper Cable terminations	m	120	
E 2.18.40.4		Control Cable	Ea.	2	
E 2.18.40.5		2.5mm ² 12-Core Copper Cable			
E 2.18.40.6		2.5mm ² 12-Core Copper Cable terminations			
E 2.18.37		5M2ME09 - Mixer 9			
E 2.18.37.1		Power cable	m	160	
E 2.18.37.2		25mm ² 4-Core Copper Cable	Ea.	2	
E 2.18.37.3		25mm ² 4-Core Copper Cable terminations	m	5	
E 2.18.37.4		10mm ² 4-Core Copper Cable	Ea.	2	
E 2.18.37.5		10mm ² 4-Core Copper Cable terminations	m	160	
E 2.18.37.6		Control Cable	Ea.	2	
E 2.18.38		5M2ME10 - Aerator 1			
E 2.18.38.1		Power cable	m	580	
E 2.18.38.2		150mm ² 4-Core Aluminium Cable	Ea.	8	
E 2.18.38.3		150mm ² 4-Core Aluminium Cable terminations	m	20	
E 2.18.38.4		Power cable (from S/S Station to Motor)	Ea.	8	
E 2.18.38.5		95mm ² 4-Core Aluminium Cable	m	145	
E 2.18.38.6		95mm ² 4-Core Aluminium Cable terminations	Ea.	2	
E 2.18.39		5M2ME14 - Aerator 5			
E 2.18.39.1		Power cable	m	740	
E 2.18.39.2		95mm ² 4-Core Aluminium Cable	Ea.	16	
E 2.18.39.3		95mm ² 4-Core Aluminium Cable terminations	m	180	
E 2.18.39.4		Control Cable	Ea.	2	
E 2.18.40		5M2ME10 - Aerator 9			
E 2.18.40.1		Power cable	m	860	
E 2.18.40.2		150mm ² 4-Core Aluminium Cable	Ea.	8	
E 2.18.40.3		150mm ² 4-Core Aluminium Cable terminations	m	20	
E 2.18.40.4		Power cable (from S/S Station to Motor)	Ea.	8	
E 2.18.40.5		95mm ² 4-Core Aluminium Cable	m	215	
E 2.18.40.6		95mm ² 4-Core Aluminium Cable terminations	Ea.	2	
E 2.18.40.7		Control Cable			
E 2.18.40.8		2.5mm ² 19-Core Copper Cable			
E 2.18.40.9		2.5mm ² 19-Core Copper Cable terminations			
TOTAL CARRIED FORWARD					

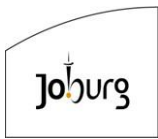


TOTAL BROUGHT FORWARD					
E 2		INSTALLATION, TESTING AND COMMISSIONING OF ELECTRICAL WORKS			
E 2.18.41		5M2ME24 - Mixed Liquor Pump 1			
E 2.18.41.1		Power cable	m	80	
E 2.18.41.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.18.41.3		2.5mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.18.41.4		Control Cable	m	75	
E 2.18.41.5		2.5mm ² 12-Core Copper Cable	Ea.	2	
E 2.18.41.6		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.18.42		5M2ME28 - Clarifier 1 Bridge Drive			
E 2.18.42.1		Power cable	m	345	
E 2.18.42.2		2.5mm ² 4-Core Copper Cable	Ea.	4	
E 2.18.42.3		2.5mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.18.42.4		Control Cable	m	340	
E 2.18.42.5		2.5mm ² 12-Core Copper Cable	Ea.	2	
E 2.18.42.6		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.18.43		5M2ME02 - Mixer 2			
E 2.18.43.1		Power cable	m	80	
E 2.18.43.2		10mm ² 4-Core Copper Cable	Ea.	4	
E 2.18.43.3		10mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.18.43.4		Control Cable	m	75	
E 2.18.43.5		2.5mm ² 12-Core Copper Cable	Ea.	2	
E 2.18.43.6		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.18.44		5M2ME02 - Mixer 6			
E 2.18.44.1		Power cable	m	110	
E 2.18.44.2		10mm ² 4-Core Copper Cable	Ea.	4	
E 2.18.44.3		10mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.18.44.4		Control Cable	m	105	
E 2.18.44.5		2.5mm ² 12-Core Copper Cable	Ea.	2	
E 2.18.44.6		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.18.45		5M2ME11 - Aerator 2			
E 2.18.45.1		Power cable	m	620	
E 2.18.45.2		120mm ² 4-Core Aluminium Cable	Ea.	4	
E 2.18.45.3		120mm ² 4-Core Aluminium Cable terminations	Ea.	4	
E 2.18.45.4		Power cable (from S/S Station to Motor)	m	20	
E 2.18.45.5		95mm ² 4-Core Aluminium Cable	Ea.	4	
E 2.18.45.6		95mm ² 4-Core Aluminium Cable terminations	Ea.	4	
E 2.18.45.7		Control Cable	m	160	
E 2.18.45.8		2.5mm ² 19-Core Copper Cable	Ea.	2	
E 2.18.45.9		2.5mm ² 19-Core Copper Cable terminations	Ea.	2	
E 2.18.46		5M2ME15 - Aerator 6			
E 2.18.46.1		Power cable	m	780	
E 2.18.46.2		150mm ² 4-Core Aluminium Cable	Ea.	4	
E 2.18.46.3		150mm ² 4-Core Aluminium Cable terminations	Ea.	4	
E 2.18.46.4		Power cable (from S/S Station to Motor)	m	20	
E 2.18.46.5		95mm ² 4-Core Aluminium Cable	Ea.	4	
E 2.18.46.6		95mm ² 4-Core Aluminium Cable terminations	Ea.	4	
E 2.18.46.7		Control Cable	m	195	
E 2.18.46.8		2.5mm ² 19-Core Copper Cable	Ea.	2	
E 2.18.46.9		2.5mm ² 19-Core Copper Cable terminations	Ea.	2	
TOTAL CARRIED FORWARD					

TOTAL BROUGHT FORWARD					
E 2		INSTALLATION, TESTING AND COMMISSIONING OF ELECTRICAL WORKS			
E 2.18.47		5M2ME19 - Mixer 10			
E 2.18.47.1		Power cable 70mm ² 4-Core Aluminium Cable	m	225	
E 2.18.47.2		70mm ² 4-Core Aluminium Cable terminations	Ea.	2	
E 2.18.47.3		Power cable (from S/S Station to Motor) 25mm ² 4-Core Aluminium Cable	m	5	
E 2.18.47.4		25mm ² 4-Core Aluminium Cable terminations	Ea.	2	
E 2.18.47.5		Control Cable 2.5mm ² 19-Core Copper Cable	m	225	
E 2.18.47.6		2.5mm ² 19-Core Copper Cable terminations	Ea.	2	
E 2.18.48		5M2ME19 - Mixer 10			
E 2.18.48.1		Power cable 70mm ² 4-Core Aluminium Cable	m	225	
E 2.18.48.2		70mm ² 4-Core Aluminium Cable terminations	Ea.	2	
E 2.18.48.3		Power cable (from S/S Station to Motor) 25mm ² 4-Core Aluminium Cable	m	5	
E 2.18.48.4		25mm ² 4-Core Aluminium Cable terminations	Ea.	2	
E 2.18.48.5		Control Cable 2.5mm ² 19-Core Copper Cable	m	225	
E 2.18.48.6		2.5mm ² 19-Core Copper Cable terminations	Ea.	2	
E 2.18.49		5M2ME20 - Aerator 10			
E 2.18.49.1		Power cable 95mm ² 4-Core Aluminium Cable	m	1000	
E 2.18.49.2		95mm ² 4-Core Aluminium Cable terminations	Ea.	8	
E 2.18.49.3		Control Cable 2.5mm ² 19-Core Copper Cable	m	245	
E 2.18.49.4		2.5mm ² 19-Core Copper Cable terminations	Ea.	2	
E 2.18.50		5M2ME23 - Aerator 13			
E 2.18.50.1		Power cable 120mm ² 4-Core Aluminium Cable	m	240	
E 2.18.50.2		120mm ² 4-Core Aluminium Cable terminations	Ea.	2	
E 2.18.50.3		Power cable (from S/S Station to Motor) 50mm ² 4-Core Aluminium Cable	m	5	
E 2.18.50.4		50mm ² 4-Core Aluminium Cable terminations	Ea.	2	
E 2.18.50.5		Control Cable 2.5mm ² 12-Core Copper Cable	m	240	
E 2.18.50.6		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.18.51		5M2ME25 - Mixed Liquor Pump 2			
E 2.18.51.1		Power cable 95mm ² 4-Core Aluminium Cable	m	85	
E 2.18.51.2		95mm ² 4-Core Aluminium Cable terminations	Ea.	4	
E 2.18.51.3		Control Cable 2.5mm ² 19-Core Copper Cable	m	80	
E 2.18.51.4		2.5mm ² 19-Core Copper Cable terminations	Ea.	2	
TOTAL CARRIED FORWARD					



TOTAL BROUGHT FORWARD					
E 2		INSTALLATION, TESTING AND COMMISSIONING OF ELECTRICAL WORKS			
E 2.18.52		5M2ME29 - Clarifier 2 Bridge Drive			
E 2.18.52.1		Power cable	m	365	
E 2.18.52.2		4mm ² 4-Core Copper Cable	Ea.	4	
E 2.18.52.3		4mm ² 4-Core Copper Cable terminations	m	360	
E 2.18.52.4		Control Cable	Ea.	2	
E 2.18.53		5M2ME03 - Mixer 3			
E 2.18.53.1		Power cable	m	95	
E 2.18.53.2		10mm ² 4-Core Copper Cable	Ea.	4	
E 2.18.53.3		10mm ² 4-Core Copper Cable terminations	m	90	
E 2.18.53.4		Control Cable	Ea.	2	
E 2.18.54		5M2ME07 - Mixer 7			
E 2.18.54.1		Power cable	m	135	
E 2.18.54.2		16mm ² 4-Core Copper Cable	Ea.	4	
E 2.18.54.3		16mm ² 4-Core Copper Cable terminations	m	130	
E 2.18.54.4		Control Cable	Ea.	2	
E 2.18.55		5M2ME15 - Aerator 3			
E 2.18.55.1		Power cable	m	700	
E 2.18.55.2		150mm ² 4-Core Aluminium Cable	Ea.	8	
E 2.18.55.3		150mm ² 4-Core Aluminium Cable terminations	m	20	
E 2.18.55.4		Power cable (from S/S Station to Motor)	Ea.	8	
E 2.18.55.5		95mm ² 4-Core Aluminium Cable	m	175	
E 2.18.55.6		95mm ² 4-Core Aluminium Cable terminations	Ea.	2	
E 2.18.56		5M2ME16 - Aerator 7			
E 2.18.56.1		Power cable	m	840	
E 2.18.56.2		150mm ² 4-Core Aluminium Cable	Ea.	8	
E 2.18.56.3		150mm ² 4-Core Aluminium Cable terminations	m	20	
E 2.18.56.4		Power cable (from S/S Station to Motor)	Ea.	8	
E 2.18.56.5		95mm ² 4-Core Aluminium Cable	m	210	
E 2.18.56.6		95mm ² 4-Core Aluminium Cable terminations	Ea.	2	
TOTAL CARRIED FORWARD					



TOTAL BROUGHT FORWARD					
E 4		INSTALLATION, TESTING AND COMMISSIONING OF ELECTRICAL WORKS			
E 2.18.57		5M2ME21 - Aerator 11			
E 2.18.57.1		Power cable 120mm ² 4-Core Aluminium Cable	m	260	
E 2.18.57.2		120mm ² 4-Core Aluminium Cable terminations	Ea.	2	
E 2.18.57.3		Power cable (from S/S Station to motor)	m	5	
E 2.18.57.4		50mm ² 4-Core Aluminium Cable terminations	Ea.	2	
E 2.18.57.5		Control Cable	m	260	
E 2.18.57.6		2.5mm ² 19-Core Copper Cable	Ea.	2	
E 2.18.58		5M2ME26 - Mixed Liquor Pump 3			
E 2.18.58.1		Power cable 70mm ² 4-Core Copper Cable	m	455	
E 2.18.58.2		70mm ² 4-Core Copper Cable terminations	Ea.	6	
E 2.18.58.3		Control Cable	m	225	
E 2.18.58.4		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.18.59		5M2ME30 - Clarifier 3 Bridge Drive			
E 2.18.59.1		Power cable 4mm ² 4-Core Copper Cable	m	385	
E 2.18.59.2		4mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.18.59.3		Control Cable	m	380	
E 2.18.59.4		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.18.60		5M2ME31 - Screw Pump 1			
E 2.18.60.1		Power cable 70mm ² 4-Core Aluminium Cable	m	555	
E 2.18.60.2		70mm ² 4-Core Aluminium Cable terminations	Ea.	6	
E 2.18.60.3		Control Cable	m	275	
E 2.18.60.4		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.18.61		5M2ME35 - Screw 1 Grease Pump			
E 2.18.61.1		Power cable 10mm ² 3-Core Aluminium Cable	m	275	
E 2.18.61.2		10mm ² 3-Core Aluminium Cable terminations	Ea.	2	
E 2.18.61.3		Power cable 4mm ² 3-Core Aluminium Cable	m	5	
E 2.18.61.4		4mm ² 3-Core Aluminium Cable terminations	Ea.	2	
E 2.18.62		5M2ME34 - Effluent Sample Pump 1			
E 2.18.62.1		Power cable 4mm ² 4-Core Aluminium Cable	m	105	
E 2.18.62.2		4mm ² 4-Core Aluminium Cable terminations	Ea.	4	
E 2.18.62.3		Control Cable	m	100	
E 2.18.62.4		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
TOTAL CARRIED FORWARD					

TOTAL BROUGHT FORWARD					
E 2		INSTALLATION, TESTING AND COMMISSIONING OF ELECTRICAL WORKS			
E 2.18.63		5M1ME40 - Chemical Dosing Pump 3			
E 2.18.63.1		Power cable 2.5mm ² 4-Core Aluminium Cable	m	280	
E 2.18.63.2		2.5mm ² 4-Core Aluminium Cable terminations	Ea.	4	
E 2.18.63.3		Control Cable 2.5mm ² 12-Core Copper Cable	m	275	
E 2.18.63.4		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.18.64		5M2ME04 - Mixer 4			
E 2.18.64.1		Power cable 16mm ² 4-Core Copper Cable	m	110	
E 2.18.64.2		16mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.18.64.3		Power cable (from S/S Station to Motor) 6mm ² 4-Core Copper Cable	m	5	
E 2.18.64.4		6mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.18.64.5		Control Cable 2.5mm ² 12-Core Copper Cable	m	110	
E 2.18.64.6		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.18.65		5M2ME08 - Mixer 8			
E 2.18.65.1		Power cable 25mm ² 4-Core Aluminium Cable	m	145	
E 2.18.65.2		25mm ² 4-Core Aluminium Cable terminations	Ea.	2	
E 2.18.65.3		Power cable (from S/S Station to Motor) 10mm ² 4-Core Aluminium Cable	m	5	
E 2.18.65.4		10mm ² 4-Core Aluminium Cable terminations	Ea.	2	
E 2.18.65.5		Control Cable 2.5mm ² 12-Core Copper Cable	m	140	
E 2.18.65.6		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.18.66		5M2ME13 - Aerator 4			
E 2.18.66.1		Power cable 150mm ² 4-Core Aluminium Cable	m	800	
E 2.18.66.2		150mm ² 4-Core Aluminium Cable terminations	Ea.	8	
E 2.18.66.3		Power cable (from S/S Station to Motor) 95mm ² 4-Core Aluminium Cable	m	20	
E 2.18.66.4		95mm ² 4-Core Aluminium Cable terminations	Ea.	8	
E 2.18.66.5		Control Cable 2.5mm ² 19-Core Copper Cable	m	200	
E 2.18.66.6		2.5mm ² 19-Core Copper Cable terminations	Ea.	2	
E 2.18.67		5M2ME13 - Aerator 8			
E 2.18.67.1		Power cable 185mm ² 4-Core Aluminium Cable	m	960	
E 2.18.67.2		185mm ² 4-Core Aluminium Cable terminations	Ea.	8	
E 2.18.67.3		Power cable (from S/S Station to Motor) 120mm ² 4-Core Aluminium Cable	m	20	
E 2.18.67.4		120mm ² 4-Core Aluminium Cable terminations	Ea.	8	
E 2.18.67.5		Control Cable 2.5mm ² 19-Core Copper Cable	m	235	
E 2.18.67.6		2.5mm ² 19-Core Copper Cable terminations	Ea.	2	
TOTAL CARRIED FORWARD					

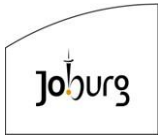
TOTAL BROUGHT FORWARD					
E 2		INSTALLATION, TESTING AND COMMISSIONING OF ELECTRICAL WORKS			
E 2.18.68		5M2ME22 - Aerator 12			
E 2.18.68.1		Power cable 150mm ² 4-Core Aluminium Cable	m	255	
E 2.18.68.2		150mm ² 4-Core Aluminium Cable terminations	Ea.	4	
E 2.18.68.3		Power cable (from S/S Station to motor)	m	20	
E 2.18.68.4		50mm ² 4-Core Aluminium Cable terminations	Ea.	4	
E 2.18.68.5		Control Cable 2.5mm ² 19-Core Copper Cable	m	255	
E 2.18.68.6		2.5mm ² 19-Core Copper Cable terminations	Ea.	2	
E 2.18.69		5M2ME27 - Mixed Liquor Pump 4			
E 2.18.69.1		Power cable 70mm ² 4-Core Aluminium Cable	m	460	
E 2.18.69.2		70mm ² 4-Core Aluminium Cable terminations	Ea.	4	
E 2.18.69.3		Power cable (from S/S Station to Motor)	m	5	
E 2.18.69.4		50mm ² 4-Core Aluminium Cable terminations	Ea.	2	
E 2.18.69.5		Control Cable 2.5mm ² 12-Core Copper Cable	m	230	
E 2.18.69.6		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
E 2.18.70		5M2ME36 - Screw 2 Grease Pump			
E 2.18.70.1		Power cable 10mm ² 3-Core Aluminium Cable	m	275	
E 2.18.70.2		10mm ² 3-Core Aluminium Cable terminations	Ea.	2	
E 2.18.70.3		Power cable 4mm ² 3-Core Aluminium Cable	m	5	
E 2.18.70.4		4mm ² 3-Core Aluminium Cable terminations	Ea.	2	
E 2.18.71		5M2ME33 - WAS Flow Control Valve			
E 2.18.71.1		Power cable 2.5mm ² 4-Core Copper Cable	m	100	
E 2.18.71.2		2.5mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.18.72		PLC80			
E 2.18.72.1		Power cable 10mm ² 4-Core Copper Cable	m	20	
E 2.18.72.2		10mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.18.72.3		Power cable 6mm ² Clear Insulated KWENA Cable	m	20	
E 2.18.72.4		6mm ² Clear Insulated KWENA Cable termination	Ea.	2	
E 2.18.73		Bioreactor Instrument DB			
E 2.18.73.1		Power cable 10mm ² 4-Core Copper Cable	m	25	
E 2.18.73.2		10mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.18.73.3		Earth cable 10mm ² Clear Insulated KWENA Cable	m	20	
E 2.18.73.4		10mm ² Clear Insulated KWENA Cable terminations	Ea.	2	
TOTAL CARRIED FORWARD					

TOTAL BROUGHT FORWARD					
E 2		INSTALLATION, TESTING AND COMMISSIONING OF ELECTRICAL WORKS			
E 2.18.74		Bioreactor MCC Room SP&L DB			
E 2.18.74.1		Power cable 16mm ² 4-Core Copper Cable	m	20	
E 2.18.74.2		16mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.18.74.3		Earth cable 10mm ² Clear Insulated KWENA Cable	m	20	
E 2.18.74.4		10mm ² Clear Insulated KWENA Cable terminations	Ea.	2	
E 2.18.75	PSY2.1.12	High Mast Light 01			
E 2.18.75.1		Power cable 10mm ² 4-Core Copper Cable	m	120	
E 2.18.75.2		10mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.18.75.3		Earth cable 10mm ² Clear Insulated KWENA Cable	m	120	
E 2.18.75.4		10mm ² Clear Insulated KWENA Cable terminations	Ea.	2	
E 2.18.76	PSY2.1.12	High Mast Light 02			
E 2.18.76.1		Power cable 10mm ² 4-Core Copper Cable	m	240	
E 2.18.76.2		10mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.18.76.3		Earth cable 10mm ² Clear Insulated KWENA Cable	m	240	
E 2.18.76.4		10mm ² Clear Insulated KWENA Cable terminations	Ea.	2	
E 2.18.77	PSY2.1.12	High Mast Light 03			
E 2.18.77.1		Power cable 10mm ² 4-Core Copper Cable	m	360	
E 2.18.77.2		10mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.18.77.3		Earth cable 10mm ² Clear Insulated KWENA Cable	m	360	
E 2.18.77.4		10mm ² Clear Insulated KWENA Cable terminations	Ea.	2	
	PSY2.1.8	<u>HYPOCHLORITE CABLES</u>			
E 2.18.78		5M5ME03 - Chemical Dosing Pump3			
E 2.18.78.1		Power cable 2.5mm ² 4-Core Copper Cable	m	55	
E 2.18.78.2		2.5mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.18.78.3		Control Cable 2.5mm ² 19-Core Copper Cable	m	50	
E 2.18.78.4		2.5mm ² 19-Core Copper Cable terminations	Ea.	2	
	PSY2.1.10	<u>WASTE SLUDGE THICKENER</u>			
E 2.18.79		5M9ME11 - WST2 Thickener Drive			
E 2.18.79.1		Power cable 2.5mm ² 4-Core Copper Cable	m	305	
E 2.18.79.2		2.5mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.18.79.3		Control Cable 2.5mm ² 12-Core Copper Cable	m	300	
E 2.18.79.4		2.5mm ² 12-Core Copper Cable terminations	Ea.	2	
TOTAL CARRIED FORWARD					

TOTAL BROUGHT FORWARD					
E 2		INSTALLATION, TESTING AND COMMISSIONING OF ELECTRICAL WORKS			
E 2.18.80		5M9ME10 - WST2 Underflow Valve			
E 2.18.80.1		Power cable	m	305	
E 2.18.80.2		2.5mm ² 4-Core Copper Cable			
		2.5mm ² 4-Core Copper Cable terminations	Ea.	2	
	PSY2.1.11	<u>WAS PUMPSTATION CABLES</u>			
E 2.18.81		5M9ME09 - WAS Pump 3			
E 2.18.81.1		Power cable	m	45	
E 2.18.81.2		10mm ² 4-Core Copper Cable			
		10mm ² 4-Core Copper Cable terminations	Ea.	4	
E 2.18.81.3		Control Cable	m	40	
E 2.18.81.4		10mm ² 12-Core Copper Cable			
		10mm ² 12-Core Copper Cable terminations	Ea.	2	
		<u>VENTILATION FAN CABLES</u>			
E 2.18.82		Ventilation Fan 01			
E 2.18.82.1		Power cable	m	20	
E 2.18.82.2		2.5mm ² 4-Core Copper Cable			
		2.5mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.18.83		Ventilation Fan 02			
E 2.18.83.1		Power cable	m	20	
E 2.18.83.2		2.5mm ² 4-Core Copper Cable			
		2.5mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.18.84		Ventilation Fan 03			
E 2.18.84.1		Power cable	m	30	
E 2.18.84.2		2.5mm ² 4-Core Copper Cable			
		2.5mm ² 4-Core Copper Cable terminations	Ea.	2	
E 2.18.85		Ventilation Fan 04			
E 2.18.85.1		Power cable	m	30	
E 2.18.85.2		2.5mm ² 4-Core Copper Cable			
		2.5mm ² 4-Core Copper Cable terminations	Ea.	2	
TOTAL CARRIED FORWARD					

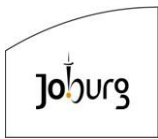
TOTAL BROUGHT FORWARD					
E 2		INSTALLATION, TESTING AND COMMISSIONING OF ELECTRICAL WORKS			
E 2.19	PSY2.1.16	INSTALLATION, TESTING AND COMMISSIONING OF ORANGE POWDER COATED 304 STAINLESS STEEL HEAVY DUTY CABLE LADDER, COMPLETE WITH UNISTRUT SUPPORT BRACKETS AND FIXING MATERIALS			
E 2.19.1		1000mm wide cable ladder - straight	m	700	
E 2.19.2		1000mm wide cable ladder - elbow	Ea.	56	
E 2.19.3		1000mm wide cable ladder - dropper / riser	Ea.	11	
E 2.19.4		1000mm cable ladder covers	m	55	
E 2.19.4		800mm wide cable ladder - straight	m	20	
E 2.19.5		800mm wide cable ladder - elbow	Ea.	0	
E 2.19.6		800mm wide cable ladder - dropper / riser	Ea.	2	
E 2.19.7		800mm wide cable ladder covers	m	10	
E 2.19.8		600mm wide cable ladder - straight	m	300	
E 2.19.9		600mm wide cable ladder - elbow	Ea.	12	
E 2.19.10		600mm wide cable ladder - dropper / riser	Ea.	6	
E 2.19.11		600mm wide cable ladder covers	m	15	
E 2.19.12		250mm wide cable ladder - straight	m	30	
E 2.19.13		250mm wide cable ladder - elbow	Ea.	3	
E 2.19.14		250mm wide cable ladder - dropper / riser	Ea.	1	
E 2.19.15		250mm wide cable ladder covers	m	10	
E 2.19.16		150mm wide cable ladder - straight	m	20	
E 2.19.17		150mm wide cable ladder - elbow	Ea.	2	
E 2.19.18		150mm wide cable ladder - dropper / riser	Ea.	3	
E 2.19.19		150mm wide cable ladder covers	m	10	
E 2.19.20		Scaffolding for cable installation in the Elutriation Pump Station and Balancing Tank	Days	10	
TOTAL CARRIED FORWARD					

TOTAL BROUGHT FORWARD						
E 2		INSTALLATION, TESTING AND COMMISSIONING OF ELECTRICAL WORKS				
E 2.2	PSY2.1.16	INSTALLATION, TESTING AND COMMISSIONING OF ORANGE PIGMENTED GLASS REINFORCED POLYESTER CABLE LADDER, COMPLETE WITH 316 STAINLESS STEEL SUPPORT BRACKETS AND FIXING MATERIALS, MOUNTED ON BUILDING WALLS OR OTHER STEEL STRUCTURES				
E 2.2.1		150mm wide cable ladder - straight	m	10		
E 2.19.20.2		150mm wide cable ladder - elbow	Ea.	2		
E 2.19.20.3		150mm wide cable ladder covers	Ea.	1		
E 2.21		EXCAVATION AND BACKFILLING OF CABLE TRENCHES, PIPE CROSSINGS AND ROAD CROSSINGS	m	10		
E 2.21.1		Trench and backfill 300mm wide x 500mm deep with one layer of protective tiles and warning tape as per Electrical Medium and Low Voltage Cable installation specification.	m	300		
E 2.21.2		Trench and backfill 150mm wide x 500mm deep with one layer of protective tiles and warning tape as per Electrical Medium and Low Voltage Cable installation specification..	m	320		
E 2.21.3		Excavate and backfill Road Crossings, including installation of sleeves. (Road Paving by others) as per Electrical Medium and Low Voltage Cable installation specification.	Ea.	2		
E 2.21.4		Cable Route Marker Posts as per specification.	Sum			
E 2.19.20		Core drill through concrete slab for electrical cable openings	Ea	10		
E 2.22		SUNDRIES				
E 2.22.1		Substation signage as per the requirements of Electrical Machinery Regulation No.4 of the Occupational Health & Safety Act of SA	Sum			
E 2.22.2		A0 Frames for mounting drawings in substation.	Ea.	1		
E 2.23		COMMISSIONING				
E 2.23.1		Commissioning Spares	Sum			
E 2.23.2		Commissioning Assistance	Hours	40		
E 2.23.3		Maintenance Spares	Sum			
TOTAL CARRIED FORWARD						R 100 000.00

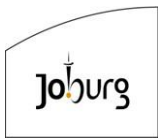


TOTAL BROUGHT FORWARD						
E 2		INSTALLATION, TESTING AND COMMISSIONING OF ELECTRICAL WORKS				
E 2.24		DOCUMENTATION CERTIFICATES, MANUALS AND QA				
E 2.24.1		Certificate of Compliance	Sum			
E 2.24.2		QA documentation for all equipment supplied	Sum			
E 2.24.3		Training	Sum			
TOTAL SECTION 4 CARRIED FORWARD TO SUMMARY						

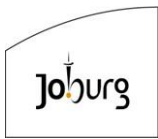
3		SECTION 5: INSTRUMENTATION AND CONTROL ENGINEERING REQUIREMENTS				
3.1		PLC PANELS				
3.1.1	PSZ 3.2.1 & PSZ 3.7	New Unit 5 Bioreactor 2 PLC (NW0580BIO02)				
C 3.1.1.1		Design Panel Layout:	ea	1		
C 3.1.1.2		Hardware Supply:	Sum	1		
C 3.1.1.3		Panel Manufacture:	ea	1		
C 3.1.1.4		FAT:	ea	1		
C 3.1.1.5		Store and Deliver:	ea	1		
C 3.1.1.6		SAT:	ea	1		
C 3.1.1.7		Install:	ea	1		
C 3.1.1.8		Loop Checks:	Sum	1		
C 3.1.1.9		Commission:	Sum	1		
3.1.2	PSZ 3.2.2	New Unit 5 Final Effluent PLC (NW0505EPS01)				
C 3.1.2.1		Design Panel Layout:	ea	1		
C 3.1.2.2		Hardware Supply:	Sum	1		
C 3.1.2.3		Panel Manufacture:	ea	1		
C 3.1.2.4		FAT:	ea	1		
C 3.1.2.5		Store and Deliver:	ea	1		
C 3.1.2.6		SAT:	ea	1		
C 3.1.2.7		Install:	ea	1		
C 3.1.2.8		Loop Checks:	Sum	1		
C 3.1.2.9		Commission:	Sum	1		
3.1.3	PSZ 3.2.3 & PSZ 3.7	New Unit 5 Main Intake Substation PLC (NW0507MIS01)				
C 3.1.3.1		Design Panel Layout:	ea	1		
C 3.1.3.2		Hardware Supply:	Sum	1		
C 3.1.3.3		Panel Manufacture:	ea	1		
C 3.1.3.4		FAT:	ea	1		
C 3.1.3.5		Store and Deliver:	ea	1		
C 3.1.3.6		SAT:	ea	1		
C 3.1.3.7		Install:	ea	1		
C 3.1.3.8		Loop Checks:	Sum	1		
C 3.1.3.9		Commission:	Sum	1		
3.1.4	PSZ 3.2.4 & PSZ 3.7	New Unit 5 Elutriation PLC (NW0508ELT01)				
C 3.1.4.1		Design Panel Layout:	ea	1		
C 3.1.4.2		Hardware Supply:	Sum	1		
C 3.1.4.3		Panel Manufacture:	ea	1		
C 3.1.4.4		FAT:	ea	1		
C 3.1.4.5		Store and Deliver:	ea	1		
C 3.1.4.6		SAT:	ea	1		
C 3.1.4.7		Install:	ea	1		
C 3.1.4.8		Loop Checks:	Sum	1		
C 3.1.4.9		Commission:	Sum	1		
TOTAL CARRIED FORWARD						



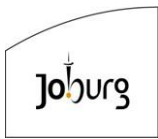
TOTAL BROUGHT FORWARD					
3.1.5	PSZ 3.2.5	New Unit 5 PST and Balancing Tank PLC (NW0501PST01)			
C 3.1.5.1		Design Panel Layout:	ea	1	
C 3.1.5.2		Hardware Supply:	Sum	1	
C 3.1.5.3		Panel Manufacture:	ea	1	
C 3.1.5.4		FAT:	ea	1	
C 3.1.5.5		Store and Deliver:	ea	1	
C 3.1.5.6		SAT:	ea	1	
C 3.1.5.7		Install:	ea	1	
C 3.1.5.8		Loop Checks:	Sum	1	
C 3.1.5.9		Commission:	Sum	1	
3.1.6	PSZ 3.2.6	New Unit 5 WST PLC (NW0504WST01)			
C 3.1.6.1		Design Panel Layout:	ea	1	
C 3.1.6.2		Hardware Supply:	Sum	1	
C 3.1.6.3		Panel Manufacture:	ea	1	
C 3.1.6.4		FAT:	ea	1	
C 3.1.6.5		Store and Deliver:	ea	1	
C 3.1.6.6		SAT:	ea	1	
C 3.1.6.7		Install:	ea	1	
C 3.1.6.8		Loop Checks:	Sum	1	
C 3.1.6.9		Commission:	Sum	1	
3.1.7	PSZ 3.2.7	New Unit 5 WAS Pump Station PLC (NW0503WPS01)			
C 3.1.7.1		Design Panel Layout:	ea	1	
C 3.1.7.2		Hardware Supply:	Sum	1	
C 3.1.7.3		Panel Manufacture:	ea	1	
C 3.1.7.4		FAT:	ea	1	
C 3.1.7.5		Store and Deliver:	ea	1	
C 3.1.7.6		SAT:	ea	1	
C 3.1.7.7		Install:	ea	1	
C 3.1.7.8		Loop Checks:	Sum	1	
C 3.1.7.9		Commission:	Sum	1	
3.1.8	PSZ 3.2.8	New Unit 5 Hyphochlorite PLC (NW0506CHL01)			
C 3.1.8.1		Design Panel Layout:	ea	1	
C 3.1.8.2		Hardware Supply:	Sum	1	
C 3.1.8.3		Panel Manufacture:	ea	1	
C 3.1.8.4		FAT:	ea	1	
C 3.1.8.5		Store and Deliver:	ea	1	
C 3.1.8.6		SAT:	ea	1	
C 3.1.8.7		Install:	ea	1	
C 3.1.8.8		Loop Checks:	Sum	1	
C 3.1.8.9		Commission:	Sum	1	
C 3.1.8.10		Loop Checks:	Sum	1	
C 3.1.8.11		Commission:	ea	1	
TOTAL CARRIED FORWARD					



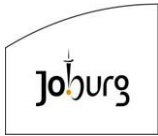
TOTAL BROUGHT FORWARD					
3.1.9	PSZ 3.2.9	Unit 5 Bioreactor 1 PLC (NW0502BIO01)			
C 3.1.9.1		Design Panel Layout:	ea	1	
C 3.1.9.2		Hardware Supply:	Sum	1	
C 3.1.9.3		Panel Manufacture:	ea	1	
C 3.1.9.4		FAT:	ea	1	
C 3.1.9.5		Store and Deliver:	ea	1	
C 3.1.9.6		SAT:	ea	1	
C 3.1.9.7		Install:	ea	1	
C 3.1.9.8		Loop Checks:	Sum	1	
C 3.1.9.9		Commission:	Sum	1	
C 3.1.9.10		Loop Checks:	Sum	1	
C 3.1.9.11		Commission:	ea	1	
3.1.10	PSZ 3.2.10	Commissioning Spares			
C 3.1.10.1		Hardware Supply:	Sum	1	
C 3.1.10.2		Test:	Sum	1	
C 3.1.10.3		Store and Deliver:	Sum	1	
3.1.11	PSZ 3.2.11	Maintenance Spares			
C 3.1.11.1		Hardware Supply:	Sum	1	
C 3.1.11.2		Store and Deliver:	Sum	1	
3.2	PSZ 3.4	INSTRUMENTS			
C 3.2.1	PSZ 3.4 Item 1	Ultrasonic Level Meters			
C 3.2.1.1		Design Panel Layout:	ea	10	
C 3.2.1.2		Hardware Supply Per Panel:	ea	10	
C 3.2.1.3		IJB Panel Manufacture:	ea	10	
C 3.2.1.4		FAT:	ea	10	
C 3.2.1.5		Store and Deliver:	ea	10	
C 3.2.1.6		SAT:	ea	10	
C 3.2.1.7		Install:	ea	10	
C 3.2.1.8		Loop Checks:	ea	10	
C 3.2.1.9		Commission:	ea	10	
C 3.2.2	PSZ 3.4 Item 2	Clamp On Flow Meters			
C 3.2.2.1		Design Panel Layout:	ea	11	
C 3.2.2.2		Hardware Supply Per Panel:	ea	11	
C 3.2.2.3		IJB Panel Manufacture:	ea	11	
C 3.2.2.4		FAT:	ea	11	
C 3.2.2.5		Store and Deliver:	ea	11	
C 3.2.2.6		SAT:	ea	11	
C 3.2.2.7		Install:	ea	11	
C 3.2.2.8		Loop Checks:	ea	11	
C 3.2.2.9		Commission:	ea	11	
TOTAL CARRIED FORWARD					



TOTAL BROUGHT FORWARD					
C 3.2.3	PSZ 3.4 Item 3	Magnetic Flow Meters			
C 3.2.3.1		Design Panel Layout:	ea	3	
C 3.2.3.2		Hardware Supply Per Panel:	ea	3	
C 3.2.3.3		IJB Panel Manufacture:	ea	3	
C 3.2.3.4		FAT:	ea	3	
C 3.2.3.5		Store and Deliver:	ea	3	
C 3.2.3.6		SAT:	ea	3	
C 3.2.3.7		Install:	ea	3	
C 3.2.3.8		Loop Checks:	ea	3	
C 3.2.3.9		Commission:	ea	3	
C 3.2.4	PSZ 3.4 Item 4	Area Velocity Flow Meters			
C 3.2.4.1		Design Panel Layout:	ea	1	
C 3.2.4.2		Hardware Supply:	Sum	1	
C 3.2.4.3		IJB Panel Manufacture:	ea	1	
C 3.2.4.4		FAT:	ea	1	
C 3.2.4.5		Store and Deliver:	ea	1	
C 3.2.4.6		SAT:	ea	1	
C 3.2.4.7		Install:	ea	1	
C 3.2.4.8		Loop Checks:	ea	1	
C 3.2.4.9		Commission:	ea	1	
C 3.2.5	PSZ 3.4 Item 5	Gas Flow Meters NOT REQUIRED			
C 3.2.6	PSZ 3.4 Item 6	Mixed Liquor Suspended Solids Analysers			
C 3.2.6.1		Design Panel Layout:	ea	1	
C 3.2.6.2		Hardware Supply:	Sum	1	
C 3.2.6.3		IJB Panel Manufacture:	ea	1	
C 3.2.6.4		FAT:	ea	1	
C 3.2.6.5		Store and Deliver:	ea	1	
C 3.2.6.6		SAT:	ea	1	
C 3.2.6.7		Install:	ea	1	
C 3.2.6.8		Loop Checks:	ea	1	
C 3.2.6.9		Commission:	ea	1	
C 3.2.7	PSZ 3.4 Item 7	Dissolved Oxygen Analysers			
C 3.2.7.1		Design Panel Layout:	ea	3	
C 3.2.7.2		Hardware Supply Per Analyser:	ea	3	
C 3.2.7.3		IJB Panel Manufacture:	ea	3	
C 3.2.7.4		FAT:	ea	3	
C 3.2.7.5		Store and Deliver:	ea	3	
C 3.2.7.6		SAT:	ea	3	
C 3.2.7.7		Install:	ea	3	
C 3.2.7.8		Loop Checks:	ea	3	
C 3.2.7.9		Commission:	ea	3	
TOTAL CARRIED FORWARD					

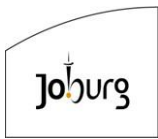


TOTAL BROUGHT FORWARD					
C 3.2.8	PSZ 3.4 Item 8.1	Phosphate Analyser Single Stream			
C 3.2.8.1		Hardware Supply Per Analyser:	ea	1	
C 3.2.8.2		FAT:	ea	1	
C 3.2.8.3		Store and Deliver:	ea	1	
C 3.2.8.4		SAT:	ea	1	
C 3.2.8.5		Install:	ea	1	
C 3.2.8.6		Loop Checks:	ea	1	
C 3.2.8.7		Commission:	ea	1	
C 3.2.9	PSZ 3.4 Item 8.2	Phosphate Analyser Dual Stream			
C 3.2.9.1		Hardware Supply Per Analyser:	ea	1	
C 3.2.9.2		FAT:	ea	1	
C 3.2.9.3		Store and Deliver:	ea	1	
C 3.2.9.4		SAT:	ea	1	
C 3.2.9.5		Install:	ea	1	
C 3.2.9.6		Loop Checks:	ea	1	
C 3.2.9.7		Commission:	ea	1	
C 3.2.10	PSZ 3.4 Item 9.1	Ammonia Analyser Single Stream			
C 3.2.10.1		Hardware Supply Per Analyser:	ea	1	
C 3.2.10.2		FAT:	ea	1	
C 3.2.10.3		Store and Deliver:	ea	1	
C 3.2.10.4		SAT:	ea	1	
C 3.2.10.5		Install:	ea	1	
C 3.2.10.6		Loop Checks:	ea	1	
C 3.2.10.7		Commission:	ea	1	
C 3.2.11	PSZ 3.4 Item 9.2	Ammonia Analyser Dual Stream			
C 3.2.11.1		Hardware Supply Per Analyser:	ea	1	
C 3.2.11.2		FAT:	ea	1	
C 3.2.11.3		Store and Deliver:	ea	1	
C 3.2.11.4		SAT:	ea	1	
C 3.2.11.5		Install:	ea	1	
C 3.2.11.6		Loop Checks:	ea	1	
C 3.2.11.7		Commission:	ea	1	
C 3.2.12	PSZ 3.4 Item 10	COD Analyser			
C 3.2.12.1		Hardware Supply Per Analyser:	ea	3	
C 3.2.12.2		FAT:	ea	3	
C 3.2.12.3		Store and Deliver:	ea	3	
C 3.2.12.4		SAT:	ea	3	
C 3.2.12.5		Install:	ea	3	
C 3.2.12.6		Loop Checks:	ea	3	
C 3.2.12.7		Commission:	ea	3	
TOTAL CARRIED FORWARD					



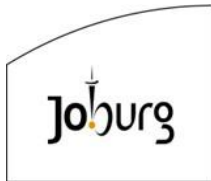
TOTAL BROUGHT FORWARD					
C 3.2.13	PSZ 3.4 Item 11	pH Analyser			
C 3.2.13.1		Hardware Supply Per Analyser:	ea	1	
C 3.2.13.2		FAT:	ea	1	
C 3.2.13.3		Store and Deliver:	ea	1	
C 3.2.13.4		SAT:	ea	1	
C 3.2.13.5		Install:	ea	1	
C 3.2.13.6		Loop Checks:	ea	1	
C 3.2.13.7		Commission:	ea	1	
C 3.2.14	PSZ 3.4 Item 12	Nitrate Analyser			
C 3.2.14.1		Hardware Supply Per Analyser:	ea	1	
C 3.2.14.2		FAT:	ea	1	
C 3.2.14.3		Store and Deliver:	ea	1	
C 3.2.14.4		SAT:	ea	1	
C 3.2.14.5		Install:	ea	1	
C 3.2.14.6		Loop Checks:	ea	1	
C 3.2.14.7		Commission:	ea	1	
C 3.2.15	PSZ 3.4 Item 13	Conductivity Analyser			
C 3.2.15.1		Hardware Supply Per Analyser:	ea	1	
C 3.2.15.2		FAT:	ea	1	
C 3.2.15.3		Store and Deliver:	ea	1	
C 3.2.15.4		SAT:	ea	1	
C 3.2.15.5		Install:	ea	1	
C 3.2.15.6		Loop Checks:	ea	1	
C 3.2.15.7		Commission:	ea	1	
C 3.2.16	PSZ 3.4 Item 14	Chlorine Analyser			
C 3.2.16.1		Hardware Supply Per Analyser:	ea	1	
C 3.2.16.2		FAT:	ea	1	
C 3.2.16.3		Store and Deliver:	ea	1	
C 3.2.16.4		SAT:	ea	1	
C 3.2.16.5		Install:	ea	1	
C 3.2.16.6		Loop Checks:	ea	1	
C 3.2.16.7		Commission:	ea	1	
C 3.2.17	PSZ 3.4 Item 15	Final Effluent Analyser Room IJB			
C 3.2.17.1		Design Panel Layout:	ea	1	
C 3.2.17.2		Hardware Supply Per IJB:	ea	1	
C 3.2.17.3		IJB Panel Manufacture:	ea	1	
C 3.2.17.4		Store and Deliver:	ea	1	
C 3.2.17.5		Install:	ea	1	
C 3.2.18	PSZ 3.4 Item 15	New Bio 1/Bio 2 Analyser Room IJB			
C 3.2.18.1		Design Panel Layout:	ea	1	
C 3.2.18.2		Hardware Supply Per IJB:	ea	1	
C 3.2.18.3		IJB Panel Manufacture:	ea	1	
C 3.2.18.4		Store and Deliver:	ea	1	
C 3.2.18.5		Install:	ea	1	
TOTAL CARRIED FORWARD					

TOTAL BROUGHT FORWARD					
3.3	PSZ 3.5	VALVE ICPs			
C 3.3.1	PSZ 3.5 Item 1	Motorised Open-Close Valve ICPs			
C 3.3.1.1		Design Panel Layout:	ea	7	
C 3.3.1.2		Hardware Supply Per ICP:	ea	7	
C 3.3.1.3		ICP Panel Manufacture:	ea	7	
C 3.3.1.4		FAT:	ea	7	
C 3.3.1.5		Store and Deliver:	ea	7	
C 3.3.1.6		SAT:	ea	7	
C 3.3.1.7		Install:	ea	7	
C 3.3.1.8		Loop Checks:	ea	7	
C 3.3.1.9		Commission:	ea	7	
C 3.3.2	PSZ 3.5 Item 2	Motorised Modulating Valve ICPs			
C 3.3.2.1		Design Panel Layout:	ea	3	
C 3.3.2.2		Hardware Supply Per ICP:	ea	3	
C 3.3.2.3		ICP Panel Manufacture:	ea	3	
C 3.3.2.4		FAT:	ea	3	
C 3.3.2.5		Store and Deliver:	ea	3	
C 3.3.2.6		SAT:	ea	3	
C 3.3.2.7		Install:	ea	3	
C 3.3.2.8		Loop Checks:	ea	3	
C 3.3.2.9		Commission:	ea	3	
C 3.4	PSZ 3.6.1	INSTRUMENT AND FIBRE OPTIC CABLES			
C 3.4.1	PSZ 3.6.1	3core 2.5mm² PVC PVC SWA PVC (Orange)			
C 3.4.1.1		Supply and Deliver:	m	4844	
C 3.4.1.2		Install:	m	4844	
C 3.4.1.3		Terminate (per cable):	ea	55	
C 3.4.2	PSZ 3.6.1	37core 1.5mm² PVC PVC SWA PVC (Orange)			
C 3.4.2.1		Supply and Deliver:	m	590	
C 3.4.2.2		Install:	m	590	
C 3.4.2.3		Terminate (per cable):	ea	20	
C 3.4.3	PSZ 3.6.1	12core 1.5mm² PVC PVC SWA PVC (Orange)			
C 3.4.3.1		Supply and Deliver:	m	1752	
C 3.4.3.2		Install:	m	1752	
C 3.4.3.3		Terminate (per cable):	ea	18	
C 3.4.3	PSZ 3.6.1	7core 1.5mm² PVC PVC SWA PVC (Orange)			
C 3.4.3.1		Supply and Deliver:	m	1660	
C 3.4.3.2		Install:	m	1660	
C 3.4.3.3		Terminate (per cable):	ea	11	
C 3.4.4	PSZ 3.6.1	4core 1.5mm² PVC PVC SWA PVC (Orange)			
C 3.4.4.1		Supply and Deliver:	m	3054	
C 3.4.4.2		Install:	m	3054	
C 3.4.4.3		Terminate (per cable):	ea	34	
TOTAL CARRIED FORWARD					



TOTAL BROUGHT FORWARD					
C 3.4.1.5	PSZ 3.6.1	3core 1.5mm² PVC PVC SWA PVC (Orange)			
C 3.4.1.5.1		Supply and Deliver:	m	640	
C 3.4.1.5.2		Install:	m	640	
C 3.4.1.5.3		Terminate (per cable):	ea	8	
C 3.4.1.6	PSZ 3.6.1	2pair 0.5mm² PVC PVC SWA PVC IOS (Orange)			
C 3.4.1.6.1		Supply and Deliver:	m	3277	
C 3.4.1.6.2		Install:	m	3277	
C 3.4.1.6.3		Terminate (per cable):	ea	45	
C 3.4.1.7	PSZ 3.6.1	4pair 0.5mm² PVC PVC SWA PVC IOS (Orange)			
C 3.4.1.7.1		Supply and Deliver:	m	597	
C 3.4.1.7.2		Install:	m	597	
C 3.4.1.7.3		Terminate (per cable):	ea	6	
C 3.4.1.8	PSZ 3.6.1	12pair 0.5mm² PVC PVC SWA PVC IOS (Orange)			
C 3.4.1.8.1		Supply and Deliver:	m	210	
C 3.4.1.8.2		Install:	m	210	
C 3.4.1.8.3		Terminate (per cable):	ea	5	
C 3.4.1.9	PSZ 3.6.1 & PSZ 3.6.3	CAT6 cable			
C 3.4.1.9.1		Supply and Deliver:	m	40	
C 3.4.1.9.2		Install:	m	40	
C 3.4.1.9.3		Terminate (per cable):	ea	4	
C 3.4.1.10	PSZ 3.8.1	2 tube microduct assembly (Orange)			
C 3.4.1.10.1		Supply and Deliver:	m	55	
C 3.4.1.10.2		Install:	m	55	
C 3.4.1.10.3		Connection:	ea	2	
C 3.4.1.11	PSZ 3.8.1	12 tube microduct assembly (Orange)			
C 3.4.1.11.1		Supply and Deliver:	m	45	
C 3.4.1.11.2		Install:	m	45	
C 3.4.1.11.3		Connection (per tube):	ea	1	
C 3.4.1.12	PSZ 3.8.1	6 pair single mode blown fibre			
C 3.4.1.12.1		Supply and Deliver:	m	726	
C 3.4.1.12.2		Install:	m	726	
C 3.4.1.12.4		Splice: (per bundle)	ea	1	
C 3.5	PSZ 3.6	<u>INSTRUMENT CABLE RACK - LADDER TYPE</u>			
C 3.5.1	PSZ 3.6.1	500 mm Ladder			
C 3.5.1.1		Supply and Deliver:	m	460	
C 3.5.1.2		Install:	m	460	
C 3.5.2	PSZ 3.6.1	300 mm Ladder			
C 3.5.2.1		Supply:	m	592	
C 3.5.2.2		Install:	m	592	
TOTAL CARRIED FORWARD					

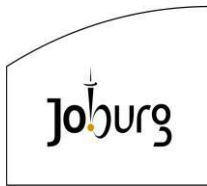
TOTAL BROUGHT FORWARD					
	PSZ 3.6.1	200 mm Ladder			
		Supply:	m	25	
		Install:	m	25	
C 3.5.4	PSZ 3.6.2	Scaffolding:			
C 3.5.4.1		Balancing Tank	Days	4	
C 3.5.4.2		New Elutriation Pump Station	Days	4	
C 3.5.4.3		Existing Elutriation Pump Station	Days	4	
C 3.6	PSZ 3.6.1 & PSZ 3.8	<u>TRENCHES AND MANHOLES</u>			
C 3.6.1		Soil Trenches	m	284	
C 3.6.2		Under Road/Paving Trenches	m	365	
C 3.6.3		Road/Paving re-establishment	m	365	
C 3.6.4		Route Markers	ea	54	
C 3.6.5		Manholes	ea	17	
C 3.7	PSZ 3.7	<u>DATA COMMUNICATIONS AND NETWORKING</u>			
C 3.7.1		Supply and Deliver new LC connector patch panels	ea	2	
C 3.7.2		Install new LC connector patch panels	ea	2	
C 3.7.3		Test all Fibre Optic Cables and Patch Panels	Sum	1	
C 3.8	PSZ 3.9	<u>TRAINING</u>	Sum	1	
C 3.9	PSZ 3.10	<u>Analyser Rooms Fit-out</u>	Sum	1	
C 3.9.1	PSZ 3.10.1	Final Effluent Analyser Room			
		Complete fit-out of analyser room with piping/tubing, valves, backboard, troughs, filtration, labelling, head pot, brackets and/or stands, power skirting with switched socket outlets and wiring to the electrical DB (distribution board) . This cost must exclude the supply and installation of an IJB, probes and analysers. Any instrument DB required will be supplied and installed by others.	Sum	1	
C 3.9.2	PSZ 3.10.2	Bioreactors 1 & 2 Effluent Analyser Room			
		Complete fit-out of analyser room with piping/tubing, valves, backboard, troughs, filtration, labelling, head pot, brackets and/or stands, power skirting with switched socket outlets and wiring to the electrical DB (distribution board) . This cost must exclude the supply and installation of an IJB, probes and analysers. Any instrument DB required will be supplied and installed by others.	Sum	1	
TOTAL SECTION 3 CARRIED FORWARD TO SUMMARY					



Contract JW13897
Northern Wastewater Treatment Works
Expansion of Capacity Unit 5 – Installation of
Mechanical and Electrical Equipment
Volume 1 Tender and Contract
Pricing Data



SCHEDULE	DESCRIPTION	AMOUNT
BROUGHT FORWARD		
1	Preliminary and General	
2	Mechanical Engineering Works	
3	Electrical Engineering Works	
4	Control and Instrumentation Engineering Works	
	<u>SUB TOTAL 1</u>	
	10 % Escalation	
	<u>SUB TOTAL 2</u>	
	12.5 % Contingency	
	<u>SUB TOTAL 3</u>	
	VAT @ 15%	
TOTAL CARRIED TO FORM OF OFFER		



Johannesburg Water (SOC) Ltd



CONTRACT NO. JW13897

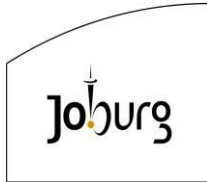
NORTHERN WASTEWATER TREATMENT WORKS

**EXPANSION OF CAPACITY UNIT 5 –
INSTALLATION OF MECHANICAL AND
ELECTRICAL EQUIPMENT**

VOLUME 2A

SCOPE OF WORK

Employer:		Contractor:	
Witness:		Witness:	



CONTRACT: JW13897
NORTHERN WASTEWATER TREATMENT WORKS
EXPANSION OF CAPACITY UNIT 5 – INSTALLATION OF
MECHANICAL AND ELECTRICAL EQUIPMENT



Volume 2A Scope of Work

C3 SCOPE OF WORK

GENERAL

This section specifies and describes the supplies, services and engineering and construction works which are to be provided and any other requirements and constraints relating to the manner in which the contract work is to be performed.

SCOPE

The Scope of the Work is set out in five portions:

Portion 1: PROJECT SPECIFICATION covers a general description of the project, the facilities available and the requirements to be met.

Portion 2: PARTICULARS OF REQUIRED MECHANICAL WORK

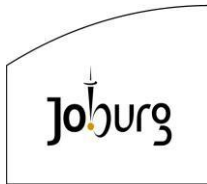
Portion 3: PARTICULARS OF REQUIRED ELECTRICAL WORK

Portion 4: PARTICULARS OF REQUIRED CONTROL AND INSTRUMENTATION WORK

DETAILS STANDARDISED GENERIC SPECIFICATIONS are included in volume 2 of the Tender Document.

Should any requirement of the Project Specification conflict with any requirement of the standard or particular specifications, the requirements of the Project Specifications shall prevail.

Employer:		Contractor:	
Witness:		Witness:	



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NORTHERN WASTEWATER TREATMENT WORKS
EXPANSION OF CAPACITY UNIT 5 – INSTALLATION OF
MECHANICAL AND ELECTRICAL EQUIPMENT

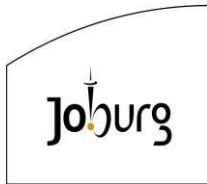


Volume 2A Scope of Work

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PS 1.2	Overview of the Works	
PS 1.3	Scope of Contract	
PS 1.4	Location of the Works	
PS 1.5	Temporary Works	
PS 2	ENGINEERING	
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Employer:		Contractor:	
Witness:		Witness:	



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NORTHERN WASTEWATER TREATMENT WORKS
EXPANSION OF CAPACITY UNIT 5 – INSTALLATION OF
MECHANICAL AND ELECTRICAL EQUIPMENT



Volume 2A Scope of Work

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Employer:		Contractor:	
Witness:		Witness:	



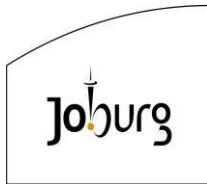
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EXPANSION OF CAPACITY UNIT 5 – INSTALLATION OF
MECHANICAL AND ELECTRICAL EQUIPMENT**



Volume 2A Scope of Work

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Employer:		Contractor:	
Witness:		Witness:	



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NORTHERN WASTEWATER TREATMENT WORKS
EXPANSION OF CAPACITY UNIT 5 – INSTALLATION OF
MECHANICAL AND ELECTRICAL EQUIPMENT



Volume 2A Scope of Work

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Employer:		Contractor:	
Witness:		Witness:	



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NORTHERN WASTEWATER TREATMENT WORKS
EXPANSION OF CAPACITY UNIT 5 – INSTALLATION OF
MECHANICAL AND ELECTRICAL EQUIPMENT



Volume 2A Scope of Work

PORTION 1: PROJECT SPECIFICATION

PS 1 DESCRIPTION OF THE WORKS

PS 1.1 Employer's Objectives

Johannesburg Water wishes to appoint a single Contractor to perform the work required to construct the Northern Wastewater Treatment Works Expansion of Capacity-Unit 5 – Phase 2 (Mechanical and Electrical). KW Joint Venture has been tasked by Johannesburg Water, under the Johannesburg Water bulk water panel appointment, to provide engineering consultancy services for the implementation of the Northern Wastewater Treatment Works Expansion of Capacity-Unit 5 – Phase 2 (Mechanical and electrical).

The capacity of the WWTW has been increased by adding Units, the latest of which was the first phase of the expansion of Capacity of Unit 5 with a nominal capacity of 50 Ml/day, commissioned in 2009. The site of Unit 5 is located over the old site of Unit 2 which was demolished during the first phase. Demolition of existing Unit 2 concrete structures and bulk earthworks to form the new terrace/s for future phases 2 and 3 and backfilling them to a uniform terrace level without low spots was done under phase 1.

JW has resolved to proceed with construction of the second phase of the expansion of Capacity of Unit 5 with a nominal capacity of 50 Ml/day.

PS 1.2 Overview of the Works

The scope of this contract covers the complete mechanical, electrical and C&I works referred to below. The civils is covered under separate contract and are in construction.

Pipework associated with the Mechanical Contract within pumpstations will be supplied up to a point 300 mm outside the walls of the pumpstations and will be indicated on the drawings. All other interconnecting pipework and pipework built up to the pumpstations is to be supplied under the civil contract.

The new phase 2 sections of the treatment plant will include primary sedimentation, flow balancing, BNR activated sludge treatment with supplemental chemical dosing facilities, secondary clarification, effluent disinfection, and site services.

On the sludge treatment side, the plant will include sludge fermentation with disposal of the fermented sludge to the digesters at Unit 2 or sludge holding tank, waste activated sludge thickening with disposal to sludge dewatering facilities. These facilities have been upgraded under a separate contract to handle the increased sludge masses from the new treatment capacity.

The Head of Works aspects of phase 2 are being handled under a separate multidisciplinary contract, However as an interim arrangement this contract will

Employer:		Contractor:	
Witness:		Witness:	



provide for a replacement of the existing screens and the installation of trash rake screens.

The electrical and C&I shall consist of the following process units:

- Unit 5 MV Switching Substation
- New Unit 5 Module 2 Bioreactor
- Balancing Tanks and PST's
- Elutriation and Odour control
- Final Effluent
- Waste Sludge Thickeners
- WAS pump station
- Some minor Works to be performed under PC Sums allowe

PS 1.3 Scope of Contract

The scope of work under this project will be on a live, operational site and the proposed tenders must therefore take cognisance of this fact when compiling their respective Occupational Health and Safety Plans and shall accommodate appropriate working procedures.

It is considered essential that the final effluent quality shall take precedence over the Contractor's rate of progress when performing the work and the Contractor shall in the construction programme make adequate allowance, therefore.

The scope of work to be performed under this contract shall consist of the mechanical and electrical works for the following :

2 x 35m diameter Primary Sedimentation Tanks.

1 x Balancing Tank, 77m long x 40m wide x 2m deep.

1 x Activated Sludge Reactor, 176.4m long, 35.2 m wide, 4.7 m deep.

3 x 35m diameter Clarifiers.

1 x 28m diameter Fermentation Thickener.

1 x 28m diameter Waste Activated Sludge Thickener.

1x 8.5m x 8.5 m mixing tank.

2 x Pumpstations (Fermentation & Final Effluent).

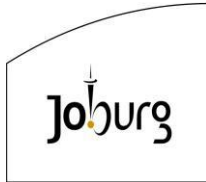
1 x Ferric dosing modifications.

1 x DBF dosing modification.

1 x Odour control plant.

2 x Trash rake screen to HOW North

Employer:		Contractor:	
Witness:		Witness:	



4 x Primary bar screens to HOW North

3 x Trash rake screen to HOW South

3 x Primary bar screens to HOW South

PS 1.3.1 Unit 5 6.6kV Switching Substation

The Main Intake Substation (Bulk Supply) will be upgraded to accommodate the power requirements of Module 2. Currently, the Module/Unit 5 6.6kV Switching Substation is fed via 2 x 150mm² XLPE cables at each incomer from the Main Intake Substation. As part of the upgrade, an additional 150mm² XLPE cable with external earth wire (KWENA) will be installed for each incomer thus making it 3 x 150mm² XLPE cables for Incomer 1 and 3 x 150mm² XLPE cables for Incomer 2. See drawing ING0645D-5E2-CR04 Rev T0 for the existing cable route from the main intake substation.

KWENA conductor cable is a composite stranded cable made up of tinned copper wires and galvanised steel wires that are braided-interwoven to form the cable. KWENA cables will be used for all external earth wires instead of copper cables to deter the current issue of theft.

All the required cable upgrades are underground i.e. will be installed in trenches.

The existing switchgear in the Module/Unit 5 6.6kV Switching Substation has enough capacity to handle the Unit 5 module 2 addition.

All proposed transformers for Module 2 will be dual wound 6.6 kV and 11kV in anticipation of proposed change to supply voltage from Eskom. See drawing ING0645D-5E2-GA03 Rev T0 for the arrangement of the Unit 5 Module 2 Substation.

PS 1.3.2 Cable Tracing

Currently, there are seven existing Medium Voltage cables that are routed within the Northern Wastewater Treatment Plant's boundary. These cables require to be re-routed due to construction upgrades on site. It is assumed that the cables are 3C, XLPE copper cables routed as per drawing ING0645D-5E2-CR04. The cables are to be traced, identified and rerouted.

PS 1.3.3 Unit 5 Standby Power

Several loads for Unit 5 will require to be fed off Standby power in the event of a municipal power failure. In order to achieve this, a Standby Generator will be placed at the Unit 5 Switching Substation. The Generator will supply voltage at 400VAC which will be stepped up to 6600VAC (6.6kV) by means of a step up transformer. The high voltage side of the transformer will then tie into the existing

Employer:		Contractor:	
Witness:		Witness:	



Unit 5 Switching Substation MV switchgear. The Generator will only be sized for the standby requirements and not the entire connected load on the Unit 5 MV ring. Load shedding will therefore be done by means of Control and Automation (by others).

The start-up of the generator shall be done via a controller with dead bus synchronising capability. The generator shall be ramped up slowly on a dead bus in order to magnetize several distribution transformers on the Medium Voltage ring.

Admin Building Standby Power

An existing DB in the Main Admin building supplies power to several offices and the plant workshop. It is required that the entire building be supplied by standby power in the event of a mains power failure. The contractor will be responsible for the supply of a generator and changeover panel as well as to tie into the existing Admin DB.

PS 1.3.4 Balancing and Primary Settling Tanks

The existing Balancing Tank and PST MCC has sufficient spare capacity to supply the new Balancing Tank and PST equipment. There are currently spare unequipped buckets that will be utilized to supply the relevant equipment. The contractor is to equip the existing MCC with motor starters for the mixers and Bridge Drives. The contractor is to also equip the existing Instrument DB to feed valves and sluice gates.

PS 1.3.5 Elutriation MCC Room

The existing Elutriation MCC has a combination of equipped spare motor starters and unequipped spare spaces to supply the new equipment. The contractor is to equip the existing MCC with motor starters for Thickener drives and pumps.

New Elutriation pump station will built next to the existing building. The new pump station will house new MCC, and PLC and associated equipment i.e. stop start stations and distribution boards.

Unit 5 Module 2 (Bioreactor 2)

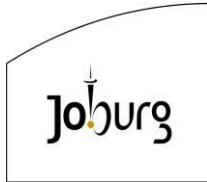
A new Bioreactor will be constructed and will be located adjacent to Bioreactor 1. The contractor will be responsible for the supply, installation and testing of the following electrical equipment associated with the Bioreactor Installation:

MV Switchgear

Step Down Distribution Transformers

Step Up Transformer

Employer:		Contractor:	
Witness:		Witness:	



Generators and associated fuel storage, piping and fuel transfer system
Medium Voltage cables
Low Voltage cables
Cable ladder and supports
Lighting and small power
Earthing and lightning protection

Hypochlorite

There is an existing MCC for the Hypochlorite Section. A new dosing pump will be added to the existing plant. The contractor will equip the existing Hypochlorite MCC with a new VSD controlled motor starter for the Chemical Dosing Pump.

PS 1.3.6 Final Effluent

With the new Unit 5 Phase 2 upgrade, a new disinfection channel will be constructed at the existing Final Effluent Area. The channel will require two additional Penstocks. The contractor is to equip the existing Final Effluent Instrumentation DB to feed the penstocks.

PS 1.3.7 Waste Sludge Thickeners (WST)

The existing WST MCC is installed in Substation 6 located around Unit 3. The existing WST MCC has spare space for new motor starter. The contractor is to equip the existing space with a motor starter for the WST2 Thickener Drive. The contractor is to also equip the existing Instrument DB to feed the WST Underflow Valve.

PS 1.3.8 WAS Pump station

There is an existing MCC installed in the WAS pump station. The MCC has spare space available for a motor starter for WAS pump 3. The contractor is to equip the existing MCC with a motor starter cubicle.

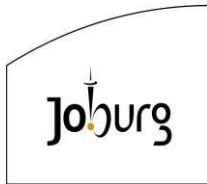
PS 1.3.9 Unit 5 Area Lighting

Area lighting around the existing and new Bioreactor is required to maintain an average lighting level of 20 lux as per SANS 10389.

Earthing and Lightning protection

A new earthing system is required for the new substation installation as well as lightning protection for all new buildings and structures. The earthing and lightning

Employer:		Contractor:	
Witness:		Witness:	



protection design and installation will be done by a specialist subcontractor according to the following design requirements:

- An earthing system consisting of a new earth mat for the Bioreactor 2 substation with a resistance of $<1\Omega$
- Lightning protection system with a resistance of $<10\Omega$ for all new buildings where required;

Control and Instrumentation Installation

The C&I portion of the work shall include but not be limited to the following:

PS 1.3.10 Unit 5 Bioreactor 2 PLC

A new floor standing PLC panel (PSZ 3.2.1) must be installed in the Unit 5 Bioreactor 2 PLC/MCC room. This panel must include a UPS and a new Ethernet switch.

PS 1.3.11 Unit 5 Final Effluent PLC

A new floor standing PLC panel (PSZ3.2.2) must be installed in the existing Unit 5 Final Effluent building. This panel must be connected to the existing Unit 5 Final Effluent PLC for the new and the existing PLC Panels to function as one integrated PLC.

PS 1.3.12 Unit 5 Main Intake Substation PLC

A new wall mounted PLC panel (PSZ3.2.3) must be installed in the Unit 5 Main Intake Substation building. This new panel must replace the existing PLC panel. This PLC panel must include a new Ethernet switch.

PS 1.3.13 Unit 5 Elutriation PLC

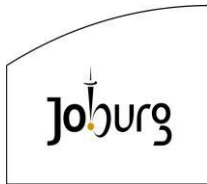
Changes must be made to the existing Unit 5 Elutriation PLC (PSZ3.2.4) to allow monitoring and control of new equipment in the existing Unit 5 Elutriation Pump Station.

A new Unit 5 Elutriation pump station will be built adjacent to the existing Unit 5 Elutriation pump station. A new floor standing PLC panel must be installed in the new Unit 5 Elutriation Pump Station. This new PLC panel must include a UPS and an Ethernet switch. This new PLC panel will be connected via fibre optic cabling to the existing Unit 5 Elutriation PLC. The new PLC panel will be configured as the "Local" panel and the existing PLC panel will be configured as the "Remote". Both the "Local" and the "Remote" panel will function as one PLC.

PS 1.3.14 Unit 5 PST and Balancing Tank PLC

New PLC equipment (PSZ 3.2.5) must be installed in spare MCC panels adjacent to the existing Unit 5 PST and Balancing Tank PLC. This new PLC equipment will be connected to the existing PLC to function as one PLC.

Employer:		Contractor:	
Witness:		Witness:	



PS 1.3.15 Unit 5 WST PLC

New PLC equipment (PSZ 3.2.5) must be installed in spare MCC panels adjacent to the existing Unit 5 WST PLC. This new PLC equipment will be connected to the existing PLC to function as one PLC.

PS 1.3.16 Unit 5 WAS Pump Station PLC

New equipment must be connected to spare inputs of the existing Unit 5 WAS pump station PLC (PSZ 3.2.7).

PS 1.3.17 Unit 5 Hypochlorite PLC

New equipment must be connected to spare inputs of the existing Unit 5 Hypochlorite PLC (PSZ 3.2.8).

Supply the stated spares in items PSZ 3.2.9 to PSZ 3.2.10.

Supply, deliver, install and commission the instrumentation, cabling and relevant panels stated in items PSZ 3.4 and PSZ 3.5.

Supply network equipment and cabling stated in PSZ 3.6 and PSZ 3.7.

PS 1.4 Location of the Works

The equipment called for under this Contract will be installed at the Northern Wastewater Treatment Works which is located at the following coordinates:

25°56'41.66" S

27°59'43.84" E

PS 1.5 Temporary Works

No equipment intended for permanent installation shall be operated for temporary purpose without the written permission of and in complete agreement with stipulations as set forth by the Employer's Agent.

The Contractor shall provide all necessary temporary drainage works, temporary pumps and other equipment as might be required for the protection, drainage and dewatering of the Works.

The Contractor shall construct and maintain all temporary access, haulage and construction roads, subject to the approval of the Employer's Agent, and permit all those with legitimate business free and unhindered usage of such roads

PS 1.6 Location of the Works

The Northern Wastewater Treatment Works is situated on the Farm Diepsloot 388 JR on Provincial Road R511 from Johannesburg to Hartbeespoort Dam, 10 km north of the N1 intersection which is located at the following coordinates:

25°56'41.66" S

27°59'43.84" E

Employer:		Contractor:	
Witness:		Witness:	



Access is by means of an existing surfaced road. See the map on drawing 30300141/12-047 for directions.

PS 1.7 Temporary Works

No equipment intended for permanent installation shall be operated for temporary purpose without the written permission of and in complete agreement with stipulations as set forth by the Engineer.

The Contractor shall provide all necessary temporary works, temporary pumps and other equipment as might be required for the protection, drainage, dewatering for the Contractor to complete the Works.

PS 2 ENGINEERING

PS 2.1 Employer's Design

There is no Employer's design. All design on the project has been completed by KW Joint Venture on behalf of the Employer. The Mechanical, Electrical, C&I, civil, building, and structural design for this contract is done by KW Joint Venture. The KW Joint Venture consists of Knight Piesold Consulting and WSP Group Africa.

When and where specific reference is made or preference shall be given to specified equipment, the Tenderer shall include such as his main offer in the Tender. Should the Tenderer fail to comply with these requirements, this may lead to the disqualification of the tender submitted.

Full details of any changes must be included with the tender. The cost of any changes to the Engineer's design shall be for the Contractor's account where full details of the changes were not submitted with the tender.

Tenderers must satisfy themselves that the layouts as proposed by the Engineer suit in all respects the equipment proposed by the Engineer or by the Tenderer as the case may be. Where equipment other than that proposed by the Engineer is accepted, it shall be the sole responsibility of the Contractor to ensure that the associated equipment including pipework is compatible with the accepted material and proposed structures.

In the case of the Engineer's acceptance of an alternative proposal, the Contractor shall submit in triplicate to the Engineer for his approval, detailed calculations and working drawings of the Contractor's alternative design proposal before any related work is executed.

An extension of Time for Completion of the Contract due to time spent on the alteration of the tender drawings to suit the Contractor's alternative proposals or due to time spent in obtaining the Engineer's approval of such alternatives, shall not be considered.

Acceptance of an alternative proposal or offer shall not relieve the Contractor of any of his obligations in terms of the Contract. The Contractor's cost of preparation and submission of an alternative proposal shall be deemed to be included in the rates tendered for the execution of the Work.

Employer:		Contractor:	
Witness:		Witness:	



PS 2.2 Drawings

Mechanical

Reduced drawings have been prepared by the Engineer and are included in Volume 4. The drawings are scanned and have no drawing package intelligence. The drawings show the general plan and sectional dimensions of the civil structures into which the mechanical, electrical, control and instrumentation equipment is to be installed. The design drawings supplied by the Engineer under this contract will have omissions in terms of equipment detail (such as pump makes, valve makes, types & ratings, circuit breaker types, surge arrestor types & ratings, instrument types and details, etc.) because these would not be known at the time of tender. It is therefore an explicit requirement of this contract that the successful Contractor keep ONE SET of these drawings updated. Updates can be handwritten updates, provided

that it is clearly legible. After commissioning, this updated set must be submitted to the engineer to enable updating of all design drawings to “As-Built” status.

The Contractor shall keep and maintain a drawing register on site which shall be made available to the Employer and the Engineer. The register shall reflect the drawing number, title, revision number and for what purpose the drawing was issued, e.g., construction.

Notwithstanding anything provided for in the GCC, the Contractor shall provide fully dimensioned detailed drawings as well as details of imposed loads by the equipment.

PS 2.3 Standards and Specifications

The following specifications are to be read in conjunction with the datasheets that will be complied with:

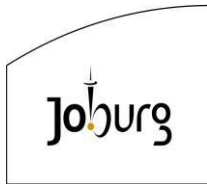
Plant Information

- Medium voltage system: 6600 Volt 3 phase 3 wire system
- LV Electrical system: 400/230 Volt, 3 phase 4 wire.
- System solid earthed TN-S.
- Maximum allowable voltage drop for motors: 4% from Motor Control Centre

(a) MV Equipment

- Ammeters
- Instantaneous and IDMT overcurrent/earth fault electronic relays
- Pendant remote switching
- Breaker position indication

Employer:		Contractor:	
Witness:		Witness:	



- Protection test block
- Emergency push button
- Arc protection
- Cable live indicators.

(b) Medium Voltage Cables 6.35/11kV

- Construction – XLPE type A
- Rated at 11kV instead of 6.6kV (to cater for potential future changes in supply voltage)
- Installed in 1m deep trenches with concrete covers, danger tape and cable markers as per Johannesburg Water Specification.

(c) Low Voltage Cable 600/1000V

- Construction – PVC/PVC/SWA/PVC
- Aluminium cables are only manufactured from 25mm², therefore for all low voltage cables copper conductors will be utilized up to a maximum size of 25mm² unless otherwise specified in the cable schedule and BOQ. For sizes greater than 25mm², Aluminium conductors will be specified in order to deter the current ongoing issue of theft.
- An Earth conductor cable that is a composite stranded cable made up of tinned copper wires and galvanised steel wires that are braided-interwoven to form the cable. These type of cables will be used for all external earth wires instead of copper cables to deter the current issue of theft.
- All low voltage cables will be installed on B26 electric orange corrosion resistant stainless steel 3CR12 cable ladders and cable trays, in cable ducts where required and 500mm deep trenches with danger tape, concrete covers and cable markers as per Johannesburg Water specification.

(d) Transformers

- Location Outdoor
- Cooling ONAN
- Vector Group Dyn11
- Mounting Concrete plinth in bunded area, stone filled soak pit.
- Protective devices Buchholz relay on Transformers over 1000kVA, Oil temperature indication and tripping.

(e) Motor Control Centres and Motor Starters

- MCCs Metal clad, IP 54 indoor mounted.
- Local isolator Metal clad, 3CR12SS IP65.
- Starting modes MCC, Field and Auto (PLC)

Employer:		Contractor:	
Witness:		Witness:	



PS 3 PROCUREMENT

PS 3.1 Preferential Procurement Procedures

Please refer to JW10 Empowerment and Preferential Procurement, page RD.22 and complete pages starting on RD.36 to RD.41 in the Returnable Document pages.

PS 3.2 Supply and Delivery of Equipment

A delivery period of 54 weeks within which all materials and equipment must be delivered to site is envisaged. If the Tenderer considers the delivery time of 54 weeks inadequate for specific items, he must specify the delivery period required for each item in the covering letter to this Contract Document.

The term "design, supply and deliver" of materials and equipment includes the purchase thereof from commercial sources, manufacturing thereof, factory corrosion protection, factory testing, provision of test certificates certifying compliance of the goods in accordance to the Specifications, provision of drawings and details, provision of special tools and keys, the handling thereof and delivery to Site.

Tender rates must provide for all the costs by the Contractor to "design, supply and deliver".

No other payment for materials and equipment shall be considered other than that under the "design, supply and deliver" items in the Schedule of Quantities.

PS 3.2.1 Purchasing of Equipment

The Contractor is required to purchase the materials and equipment necessary for the Contract as soon as possible thus limiting the effect of inflation.

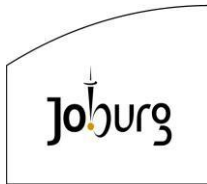
The Contractor must strive to keep the number of suppliers to a minimum.

Payment for materials and equipment shall only be effected if the Contractor can prove ownership of the items.

In the case that off-site storage is agreed by the Engineer and Johannesburg Water then payment shall only be effected if the Contractor can prove ownership and that cession of ownership from the Contractor to Johannesburg Water takes place.

NOTE - It shall be the Contractors responsibility to ensure that the necessary warranties from the equipment suppliers is negotiated such that it only comes into effect on date of issue of completion certificate which shall only take place any time up to 20 months after delivery of the equipment

Employer:		Contractor:	
Witness:		Witness:	



PS 3.2.2 Guarantee of Equipment

It is an express condition of this Contract that the guarantee period on all equipment given by the suppliers to the Contractor shall only commence once the works is in operation. This stage shall be reached once the Certificate of Completion has been issued.

PS 3.2.3 Particulars of Equipment Offered

The Tenderer shall include comprehensive information covering every item of equipment offered with his Tender. The Engineer shall be able to determine, without reference to the suppliers, any information regarding delivery, drive, power consumption, efficiency, accuracy, etc. applicable under the specified range of operation conditions.

Technical information regarding pumps, motors, valves, pipework, gearboxes, fabrications, flow meters, instrumentation, dimensions, etc. shall also be supplied.

Failure to comply with the above requirement may lead to the disqualification of the Tender submitted.

PS 3.3 Subcontracting

The requirement of Form JW 6.1 Special Conditions, T2.1.4 Preferential Procurement, Page RD.14 which is part of the Returnable Documents is applicable.

The Contractor shall obtain the written approval of the Engineer before appointing any subcontractor. The Contractor shall be solely responsible for the supervision of and payments to such a subcontractor (s), and the approval of a subcontractor by the Engineer shall not indemnify the Contractor from any of his liabilities in terms of the Contract. See GCC 2015- Clause 4.4.

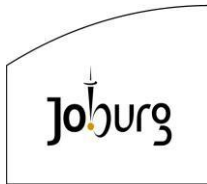
PS 3.4 Socio Economic Objectives

PS 3.4.1 General

The Employer is committed to transformation within the water sector through the optimisation of socio-economic benefits within its sphere of business influence in terms of the Broad Based Black Economic Empowerment Act. The general principles, upon which the implementation of Johannesburg Water project is based, are:

- Contribute to Local economic development by optimising the use of Local resources;
- Promote transformation, technology and skills transfer within the infrastructure development
- industry through short term employment creation, preferential procurement, enterprise
- development, training and skills development objectives; and

Employer:		Contractor:	
Witness:		Witness:	



- Ensure the project is implemented in a socially responsible and sustainable manner.

The Employer is bound by legislative contractual obligations relating to employment, preferential procurement, enterprise development and skills development, aimed at contributing to economic growth and expansion of the supplier base in the construction sector, as follows:

- Employment - the Employer is committed to optimise the employment opportunities for Local black people and black women in particular; and preferentially employ Locals through appropriate channels to minimise the chances of an influx of migrant work seekers.
- Enterprise Development, Johannesburg Water (SOC) aims to develop established Contractors that are at least 51% black owned to enable them to implement appropriate business management systems and be in a position to undertake future multi-disciplinary projects either independently or at JV partner level.

PS 3.4.2 Employment

The Employer is committed to optimise the employment opportunities for Local black people and black women through a project appointed Community Liaison Officer (CLO), refer to P.S 6.13 and P.S 6.14 for detail specification.

PS 3.4.3 Enterprise Development

To mentor the local SMME, the Contractor shall ensure that a suitably qualified and experienced individuals on his site staff mentor(s) to provide the requisite technical and business management systems mentoring services. The Mentor needs to be knowledgeable such that skills transfer can be effected on all aspects of the business. During execution of the enterprise development requirements, the Contractor shall remain obligated to complete the Works on time. The Contractor shall comply with the following requirements:

- The Contractor shall enter into formal agreement with the local SMME subcontractor.
- The Contractor shall pay his employees and shall ensure that his Subcontractors pay their employees rates of remuneration not less than that prescribed minimum wage as per applicable legislation.
- The Contractor, in the fulfilment of his obligations under the Contract, shall observe conditions of employment for those trades and occupations which are customary in the area in which the Works are to be constructed. The Contractor shall also practice and ensure that his Subcontractors practice a policy of equal remuneration, conditions of employment and benefits for people of equal skills and productivity.

PS 3.4.4 Administrative Matters

The Contractor shall assist and train the Subcontractor with reference to registration with all appropriate authorities such as CIBD, the Unemployment Insurance Act, Compensation for Occupational Injuries and Diseases Act (130 of 1993) and all the regulations made thereunder. The Contractor shall have

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an obligation to audit the Subcontractor's compliance with reference to the all appropriate authorities.

The Contractor shall further have an obligation to mentor and train the appointed local SMME in matters relating to relevant all taxes.

PS 3.4.5 Payments

The Contractor shall mentor the Subcontractor with reference interim monthly claim submission in accordance with the provisions of Subcontract agreement signed with the subcontract.

Unless stated otherwise in the Contract Data, the Contractor shall pay the Subcontractor within seven (7) working days of the Contractor receiving an approved interim monthly subcontractor claim with no reference to the Contractor's payment agreement with the Employer.

If part of the Subcontractor's claim is in dispute the amount not in dispute shall be paid to the Subcontractor in accordance with the provisions of the above payment provision. Any patent errors or omissions that may be discovered by the Contractor shall not be cause for delay in payment of the adjusted amount.

PS 3.4.6 Training and Skills Development

The Employer is committed to the development of unskilled, semi-skilled and skilled labour, the Contractor shall provide formal approved training and skills development programme aimed primarily to improve the literacy and skills of site-based staff, in order to increase the probability of employment post the project employment.

PS 4 CONSTRUCTION

PS 4.1 Applicable SANS 1200 Standards

The Standard Specifications for any associated civil work applicable to this Contract are not issued with this volume but are available at the Contractor's expense from: Standards South Africa,

Office Address:

1 Dr Lategan Road; Groenkloof; PRETORIA

Postal Address:

Private Bag X191; PRETORIA; 0001

Telephone:

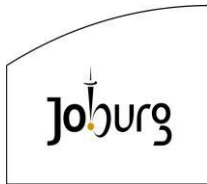
National: (012) 428-6883 / International: + 27 12 428 6883

Telefax:

National: (012) 428-6928 / International: + 27 12 428 6928

Email: sales@sabs.co.za

Employer:		Contractor:	
Witness:		Witness:	



PS 4.2 Particular Specifications

The following Particular Specifications forming part of the Contract have been written to cover phases or items of work involving a specialist type of operations or material to be encountered on this Contract and that are not adequately covered by the general specifications.

JW Mechanical Specifications	
No / Rev No	Description
G01	Colour Coding Of Equipment
G02	Corrosion Specification
M01 - Rev 5	Mechanical Screen Equipment
M03 – Rev 5	Mechanical Primary Sedimentation Tanks
M04 – Rev 5	Mechanical Balancing Tanks
M05 – Rev 4	Mechanical Mixing Equipment
M06 – Rev 5	Mechanical Aeration Equipment
M07 - Rev 5	Mechanical Propellor Pumping Equipment
M08 – Rev 5	Mechanical Gearboxes
M09 – Rev 5	Mechanical Archimedian Screw Pump Equipment
M10 – Rev 4	Mechanical Secondary Clarifier Tanks Equipment
M11 – Rev 4	Mechanical Fermentation Tanks
M13 - Rev 4	Mechanical Sludge Thickener Tanks
M16 - Rev 4	Mechanical Conveyor Equipment
M17 – Rev 4	Mechanical Actuator Equipment
M18 – Rev 4	Mechanical Centrifugal pumps
M20 – Rev 4	Mechanical Valves
M21 – Rev 4	Mechanical Pressure pipework
M26 – Rev 4	Mechanical Dosing pumps
M27 – Rev 2	Disinfection System
M32 – Rev 3	Ferric Handling Storage and Dosing
M33 – Rev 2	Elutriation Pumps
M34 – Rev 2	Mechanical Sluice / Channel Gates, Adjustable Weirs, Hand Stops and Stop Logs

Volume No.	JW Electrical Design Standards	Rev. No.
E01	Electrical Motors	3
E02	Electrical Cable Racking	4

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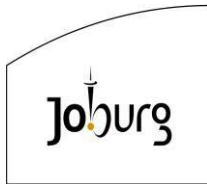
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Volume No.	JW Electrical Design Standards	Rev. No.
E03	Electrical Isolator Pushbutton station (Local Start/Stop) Equipment	4
E04	Electrical Low Voltage Distribution Boards and Motor Control Centres	5
E05	Electrical Low Voltage Power & Control Cables	4
E06	Electrical Medium and Low Voltage Cable Installation	4
E07	Electrical Industrial Welding Plugs, Couplers and Socket Outlets	3
E08	Electrical Wiring	3
E09	Electrical Building Installation	3
E10	Electrical Busbar Trunking	3
E11	Electrical Earthing and Lightning Protection	4
E12	Electrical Medium Voltage Cables	3
E13	Electrical Medium Voltage Switchgear	3
E14	Electrical Supply and Installation of A Standby Generator	3
E15	Electrical Transformers	3
E19	Electrical 11kV Ring Main Unit	1
E21	Electrical Lighting and Illumination	1
E23	Electrical Power Factor Correction	1
E26	Electrical Colour Coding of Equipment	1

Volume No.	Control & Instrumentation Standards	Rev. No.
3	PLC Panels	15
5	Clean Power and Surge Protection	14
6	Cabling	17
7	Networking	15
8	Flow Measurement	18
9	Level Measurement	14
19	Field Junction Boxes and Panels	19
23	Load Cells	8
25	Pressure Measurement	3

The above listed specifications are bound in Volume 2.

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PS 4.3 Plant and Materials

Johannesburg Water shall have the right to refuse acceptance of any material or workmanship which is found to be unsound, damaged, or contrary to the specification, or which is found during the Period of Maintenance or during tests in situ to be defective or in any way contrary to the specification due to causes within the Contractor's control or responsibility. All material or construction rejected by the Engineer shall be replaced or repaired by the Contractor at his own expense to the satisfaction of the Engineer, whose decision regarding this matter shall be binding on the Contractor.

All materials used shall be the best of their respective kinds and shall be suitable for working at the pressures and temperatures involved under all working conditions, without distortion or deterioration or the setting up of undue stresses in any part and without impairing the efficiency or reliability of the plant and the strength of its component parts. No welding, burning, filling, or plugging of defective castings shall be permitted without the Engineer's approval in writing.

PS 4.4 Construction Equipment

Construction equipment shall be suited for the onsite intended use and shall conform to all relevant safety aspects required by the OHS Act.

PS 4.5 Existing Services

The existing treatment works must remain in operation during the execution of the contract. The Employer must have access to the works at all times. If the work to be done requires the treatment works to be out of operation for a short period, prior arrangements must be made at least one week in advance with the Engineer.

There are several points of connection to the existing structures, channels, pipelines, as well as electrical and control networks with the new works that should be regarded by the Contractor as being tie-ins to live systems. The Contractor must give the Engineer and the Works Manager ten days written notice of any disruption to the normal plant operations and shall comply with all requirements of the Works Manager in arranging the required connection.

The known existing services are shown on the drawings. The positions of the services cannot be guaranteed. On establishing on Site, the Contractor shall determine the positions of all pipelines and cable routes on Site with the assistance of the Engineer's and the Employer's staff on Site. The Contractor shall take precautions to prevent any damage to existing services.

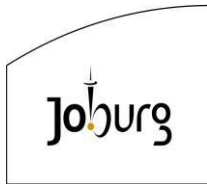
Any damages which might occur shall be repaired at the cost of the Contractor, to reinstate the services to that of the original status prior to the commencement of the Contract.

PS 4.6 Site Establishment, Facilities Available and Required

PS 4.6.1 Water Supply for Construction Purposes

The Contractor shall make a connection to the existing potable water pipeline within approximately 200 meters from the area available for the erection of site

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offices and stores. Any use of this connection shall be measured, and the Contractor shall be held responsible for payment of the water measured at the current municipal rates. The connection to the existing network shall include an approved water meter (supplied by the Contractor), that will be used to measure the quantity of the water used by the Contractor. The Contractor shall also provide, at his own cost, all connections fittings, pipework, temporary plumbing, and pumps necessary to distribute the water on site.

Delivery pressures at the take-off points on the water main cannot be guaranteed.

JW does not guarantee continuity of supply and in such cases the Contractor shall make his own provision for standby supplies to maintain continuity. The variation of pressure in the water supply and or breakdown in the supply shall not be grounds for an extension of time or compensation.

PS 4.6.2 Power Supply for Construction Purposes

Supply of Electricity

The Contractor shall make a connection to an existing power distribution point within approximately 200 meters from the area available for the erection of site offices and stores. Any use of this connection shall be measured, and the Contractor shall be held responsible for payment of the amount measured at the current municipal rates. The connection to the existing network shall include an approved meter (supplied by the Contractor), that will be used to measure the power used by the Contractor. The Contractor shall also provide, at his own cost, all transformers, HT and LT cables required to distribute the power on site.

Conditions of Supply

All installations connected to a supply of electricity provided by JW shall comply with the regulations. Failure to comply with the Safety requirements may lead to immediate disconnection.

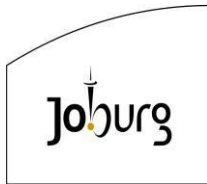
No connection shall be made to the permanent installation without the prior approval of the Engineer and the Work Manager.

No guarantees of power supply quality are given, and power supply breaks of some duration may occur without warning. The Contractor shall make arrangements, at his own expense, to maintain continuity and quality of power. Any breakdown in power supply or reduction of power supply shall not be grounds for an extension of time or compensation.

Application for Supply

A request for power shall be submitted to the Works Manager via the Engineer at least two weeks before a power supply is required.

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PS 4.6.3 Lifting Equipment

Lifting equipment is not available on the site, the Contractor shall therefore make the necessary arrangements for these facilities for the off-loading, handling, and installation of equipment.

PS 4.6.4 Site Office, Store and Housing

The employer shall make available a suitable area for the Contractor's site offices, workshops, and stores. The area available may be shown on the Construction drawings. The Contractor shall advise in his tender the area required for site establishment.

Although the security of the Works is outsourced by Johannesburg Water to a security firm, the Contractor shall make his own arrangements to secure the facilities provided.

No employees, apart from a security guard, may be housed on the Site of the Works.

Upon completion of the work in terms of this contract, the site must be cleared of all structures, concrete slabs and waste and excavations must be backfilled.

The Contractor must make the necessary arrangements with Johannesburg Water to obtain access for the vehicles and personnel he intends to employ on site.

PS 4.6.5 Telephone Facilities

The Contractor shall be responsible for arranging his own telephone facilities and shall be responsible for all costs relating thereto.

PS 4.6.6 Ablution Facilities

Ablution facilities are not available on site. The Contractor shall therefore make the necessary arrangement to provide these facilities. Chemical serviced toilets shall be the minimum acceptable standard. These must be placed in a position to be approved by the Engineer. The facilities must be to the Engineer's approval and must be maintained in a clean and sanitary condition.

PS 4.6.7 Storage Facilities

Johannesburg Water has no storage facilities available for use by the Contractor who must make his own arrangements in this regard.

PS 4.6.8 Laboratory Facilities (Testing)

The Contractor shall provide on-site laboratory facilities necessary to satisfactorily perform all the site control and testing requirements called for in the Contract.

PS 4.7 Site Facilities Required

PS 4.7.1 Facilities for the Engineer

Two name boards (Provisional Quantity) shall be erected, and the boards shall comply with the format and size shown on Drawing No. 30300141-12-007 bound in Volume 4, as a reduced drawing.

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No other name board than stated above shall be allowed and on completion of the works, the Contractor shall remove the board from the Site of Works on completion of the maintenance period and prior to the release of retention monies.

Office Building

Three offices, complete with furnishings as specified, must be provided by the Contractor for the exclusive use by the Engineer.

The Contractor must consult with the Engineer prior to the supply and erection of the office.

Carports

A carport to provide for four motor vehicles shall be provided adjacent to the Engineer's office for his exclusive use. The carport shall have side cladding and shall be constructed in such a way as to shelter the parked vehicles from the prevailing winds and rain.

Ablution and Latrine Facilities

The Contractor shall, in addition to catering for his own staff, provide ablution and latrine facilities adjacent to the Engineer's office for the exclusive use of the Engineer and his staff. The facilities shall consist of a hand washbasin and a latrine. Serviced Chemical toilets shall be the minimum type of ablution acceptable to the Employer.

The facility shall be maintained in a clean and hygienic condition.

First-aid Kit and Protective Clothing

The Contractor shall provide on the Site of Works two first-aid kits to deal with accidents, illnesses and snakebite which may occur during the normal course of Site operations.

The Contractor shall provide two sets of safety helmets and rubber boots for the exclusive use of the Engineer and his staff.

Services for Office and Ablutions

The Contractor shall provide, at his own cost, a constant supply of potable water and electric power to the Engineer's office and ablutions.

PS 4.8 Measurement and Payment

The site facilities described in PS 4.7.1 for the Engineer have been provided for in the Preliminary and General Items.

PS 4.9 Facilities for the Contractor

The Contractor must provide, maintain, and remove his own facilities to the satisfaction of the Engineer. The Contractor shall provide the area around his office, stores and sheds (i.e. the "Camp") with adequate security fences to ensure that unauthorised persons do not enter the camp area and security personnel should he deem it necessary.

The Contractor shall provide on-site laboratory facilities necessary to satisfactorily perform all the site control and testing requirements called for in the Contract.

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The tendered sums for as scheduled by the Engineer, whether grouped or individually, shall include all costs for the installation, maintenance and removal of the fencing as specified, in addition to all other facilities specified and as required by the Contractor for his own purposes.

PS 4.10 Waste Disposal Sites

The Contractor shall make his own arrangements for solid and liquid waste disposal. Disposal shall take place at an approved Site. No approved sites are available within the Northern Works terrain.

PS 4.11 Site Usage

Access to the Site is by means of existing gravel / tarred roads from the North or through the Works main access gate, which is controlled by a security company appointed by Johannesburg Water. No restriction on access to the Site of Works shall be placed on persons or vehicles involved with the execution of the Works. All traffic must be restricted to the maximum speed of 40 km/h and vehicles must be driven with extreme caution. The Contractor shall only make use of the site area as indicated on the drawings or as directed by the Engineer.

The Contractor shall be required to report daily to Management personnel of the Works.

The Contractor's staff shall be identified by either clothing or an identification tag, which shall be displayed when entering the Site of Works.

Movement within the Site of Works is restricted to avoid damage to the existing services, structures, trees and, where practical, to the gardens. The making good of any damage caused by non-observance of such restrictions shall be for the Contractor's account.

Access is to be made available to Johannesburg Water's employees to any portion of the site whenever required.

PS 4.12 Permits and Wayleaves

Work permits shall be completed and shall be area specific.

As the Contract shall require the removal of equipment from Site, the Contractor shall acquire permits as required by the Employer.

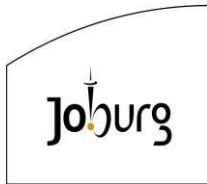
No wayleaves are envisaged under the Contract. The Works called for under this Contract shall be executed within the works site boundaries.

PS 4.13 Alterations, Additions, Extensions and Modifications to Existing Works

The Contractor's attention is drawn to the works to be undertaken by the separate civil contractor that involves tying into the existing Unit 5 services /structures. These include but are not limited to the following main process tie-ins:

- Primary Sedimentation Tank (influent, effluent, sludge, and scum).
- Balancing Tank (influent, overflow, and effluent).
- Reactor/Clarifier (influent, effluent, waste sludge and scum).
- Fermentation (sludge feed, recycle, elutriant, elutriate and others, thickened sludge).

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- WAS Thickener (influent, effluent, sludge).
- Disinfection (influent, effluent, and pump station take-offs).
- Balancing Tank overflow relocation.

PS 4.14 Inspection of Adjoining Properties

The Contract does not require the Contractor to perform inspections of adjoining properties.

PS 4.15 Survey Control and Setting out of the Works

The Contractor shall provide permanent beacons marking the main setting out grid lines for all construction works and permanent level benchmarks. An item for this work has been provided in the Bill of Quantities. JW shall not be held responsible if any of the beacons are removed if there are other beacons existing.

The Contractor shall take reasonable steps to preserve beacons and benchmarks he has provided.

All necessary pegs, profiles, site rails and other devices required for the setting out of works from the main beacons shall also be supplied and erected by the Contractor to the satisfaction of the Engineer. The cost of these secondary setting out points shall be borne by the Contractor and shall be deemed to be included in his rates and prices.

The Contractor shall be responsible for the setting up, marking and core drilling of holes for the new position of the holding down bolts.

PS 4.16 Accommodation and Care of Employees

Accommodation will not be provided by JW and the Contractor shall make his own arrangements for accommodation where required.

PS 4.16.1 Housing

No employees, apart from security guards, may be housed on the Site of Works. Although the security of the Works is outsourced by JW, to a security firm, the Contractor shall make his own arrangements to secure the facilities provided for under the Contract.

The Contractor must make the necessary arrangements with Johannesburg Water to obtain daily access for the vehicles and personnel he intends to employ on site.

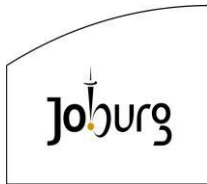
PS 5 MANAGEMENT OF THE WORKS

PS 5.1 Applicable SANS 1921 Standards

For the purposes of this Contract the following National Standard shall be applicable: -

SANS 1921 -1: 2004 first edition (1): Construction and Management Requirements for Works Contracts: Part 1: General engineering and construction works.

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Witness:		Witness:	



PS 5.2 Planning and Programming

PS 5.2.1 Detailed Programme

A detailed programme in terms of the General Conditions of Contract clauses 5.6.1 to 5.6.2.7, complete with a cash flow budget for the execution of the works must be made available to the Engineer for approval within 14 days after the receipt of the letter of acceptance. Aspects that shall require co-ordination with the Employer must be indicated clearly and provision must be made for it in the programme.

It is expected that this Contract will be awarded during **September 2024** and the works must be operational towards **September 2026** (A contract completion period of 86 weeks).

No work of a permanent nature may be executed before the programme has been approved by the Engineer.

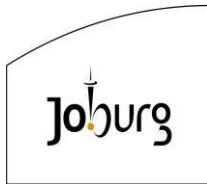
The Engineer retains the right to alter, as circumstances may require, the sequence in which installation is to be executed. Such alterations shall only be made after consultation with all parties concerned.

In drawing up the programme, reference shall be made to clauses PS 3.2, PS 4.5, PS 5.3 and PS 5.7. Also allow for the stipulation that the new works as a whole must be fully operational for an uninterrupted period of 14 days before the equipment shall be considered as being successfully installed and commissioned (PS 5.7).

Such programmes, supporting reports and Method Statements shall be used by the Contractor to plan, execute and control the Works, inter-alia:

- To monitor and record progress relative to completion requirements and significant dates and for the preparation of schedules and graphs for progress meetings and reports;
- As the basis for scheduling the issue by the Employer's Agent of construction Drawings;
- As the basis for scheduling submissions by the Contractor to the Employer's Agent of his various Plans, Method Statements, Designs, Drawings and other Contractor's Documents;
- As the basis for scheduling quality inspections, monitoring at hold points and tests by the Employer's Agent and/or his designated Approved Inspection Authority as covered in more detail in the Specification;
- As a basis for planning and monitoring resource allocations;
- To assess interaction and co-ordination with Subcontractors from various disciplines;
- As the basis for planning, scheduling and coordinating dry season construction activities;
- As the basis for planning and scheduling hydrostatic testing on the pipelines;
- As the basis for scheduling Tests on Completion;

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- To assess the need for formal revision of the Contract Programme as described in Clause 5.6.4;
- To generate input to cost flow and cash flow forecasts/actuals; and

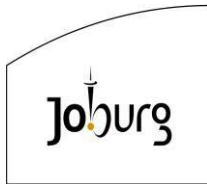
As an indication of the timing of key events such as resources mobilisation and delivery to Site of Plant and materials.

There will be numerous subcontractors at work on the same site. The Contractor will be required to adjust his programme to accommodate the access and working needs of subcontractors. The Contractor will be required to interface his programme with the programmes of the subcontractors in consultation with the Engineer during the construction period.

The Contractor shall submit with his tender his proposed programme of construction for approval by the Engineer. Thereafter, the Contractor may not deviate from his proposed sequence of construction without the prior approval of the Engineer. The contract programme submitted shall show the manner and order of all proposed work fronts. The Contract programme shall take account of the following:

- The Contractor shall appoint a project programmer / planner for liaison during the Contract.
- No deviation from the approved sequence of construction shall be accepted without prior written approval.
- The programme shall not be in the form of a bar chart only but shall be in MS project format complete with resources for each activity and show clearly the anticipated quantities of work to be performed each month, together with the anticipated cashflow for each month of the project.
- If, during the progress of the work, the quantities of work performed per month fall below those shown on the programme or if the sequence of operations is altered, or if the programme is deviated from in any other way, the Contractor shall, within one week after being notified by the Engineer, submit a revised programme.
- If the programme is to be revised by reason of the Contractor falling behind his programme, he shall produce a revised programme showing the modifications to the original programme necessary to ensure completion of the Works or any part thereof within the time for completion.
- Failure on the part of the Contractor to submit or to work according to the programme or revised programme shall be sufficient reason for the Employer to take steps as provided for in the General Conditions of Contract.
- The approval by the Engineer of any programme shall have no contractual significance other than that the Engineer would be satisfied if the work is

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carried out in accordance to such programme and that the Contractor undertakes to carry out the work in accordance with the programme. It shall not limit the right of the Engineer to instruct the Contractor to vary the programme should circumstances make this necessary.

PS 5.2.2 Methods and Procedures

The Contractor is to supply detailed method statements, complete with resources as to how he intends to complete the work on the project.

PS 5.2.3 Programme Consideration

The scope of work under this project will be on a live, operational site and the proposed tenders must therefore take cognisance of project interface with operational activities, the following tie-in are to be considered in the detailed programme.

- The existing Unit 5 Module 1 is fed via a Medium Voltage (MV) ring from the Unit 5 Switching Substation. Unit 5 Module 2 will be incorporated into the same MV ring which is currently live.
- The following existing MCCs, currently operational, will be modified:
 - Balancing Tank and PST
 - Hypochlorite
 - WAS Pump Station
 - WAS Terrace
 - Elutriation Pump Station

Execution of the above-listed activities shall be carried out in liaison with the Works' personnel and the Employer's Agent in order to minimize downtime for the existing operation.

PS 5.3 Sequence of the Works

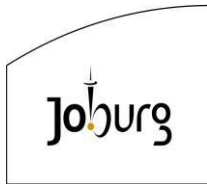
As per Clause 5.6.1 of the General Conditions of Contract the Contractor shall submit for approval to the Engineer, within the time stated in the Contract Data, a detailed programme showing the order of, procedure and method in which he proposes to carry out the Works and as well as his method of measurement of progress.

The Contractor's attention is drawn to the fact that the mechanical equipment is to be installed into existing civil structures and this should be taken into consideration when designing the mechanical and electrical works prior to fabrication/procurement.

The Contractor shall, therefore, be required to take this into account in drawing up his programme for approval.

Areas, which will be affected by this constraint, are:

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- 1) Central Columns PST's, Clarifiers, Elutriation thickener, Waste Sludge Thickener;
- 2) Balancing Tank Mixer Platforms;
- 3) Bioreactors - Aerator and Mixer Platforms, Axial Flow Pump Structures; and
- 4) Archimedes Screw (Sludge) Pump Stations
- 5) Effluent pump station
- 6) Elutriation Pumpstations and mixing tank.
- 7) MCC /PLC room
- 8) DBF tank base.
- 9) Fermentation pump station
- 10) Existing HOW (North) screening and inlet channels
- 11) Existing HOW (South) screening and channels.

Constraints

The Contractor shall take into consideration that the screening equipment to be replaced plus new trash rakes shall be installed into existing channels and that the equipment should be designed accordingly.

The time period for completing the Mechanical works is indicated in the Indicative Programme forming part of the Tender Drawings.

The contractor's programme to be submitted with the tender shall allow sufficient time for the Electrical Contractors to complete their scope of works within the contract period.

The Contractor shall, whenever required by the Engineer, furnish for his information particulars in writing of the Contractor's arrangements for the carrying out of the works and of the plant and temporary works that the Contractor intends to supply, use, or construct, as the case may be. The submission to and approval by the Engineer of such programme, or the furnishing of such particulars will not relieve the Contractor of any of his duties or obligations under the contract.

The Tenderer shall submit with his tender separate management and supervisory organisation charts and supervisory and labour histograms as well as an estimated cash flow for the project.

PS 5.4 Software Application for Programming

All construction programmes for the Completion of the Works shall be submitted to the Engineer in an approved format and software programme. (MS projects is considered acceptable software)

PS 5.5 Quality Plans and Control

Quality plans and the control shall be in accordance with the requirements of the Particular Specifications as compiled and included herein after and forming part of the Contract document. These shall be completed and inserted in the data books after commissioning.

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PS 5.6 Other Contracts and Facilities to Other Contractors and Authorities on Site

This contract entails mechanical works and shall be awarded to one main Contractor. The main Contractor shall be responsible to co-ordinate all works of a mechanical nature.

The main Contractor will be expected to liaise with and accommodate a number of civil and electrical contractor's sub-contractors.

It is expected of the Contractor to schedule his work in such a way to ensure optimal completion of the work as a whole. The Engineer retains the right to intervene and prescribe where and when work must be executed in order to ensure a well-coordinated completion of the works as a whole.

Access is to be made available to employees of Johannesburg Water to any portion of the works whenever required for normal operation and maintenance of the existing works.

PS 5.7 Testing, Completion, Commissioning and Correction of Defects

PS 5.7.1 Installation and Commissioning

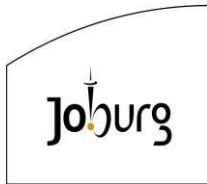
The Contractor shall be responsible for co-ordinating all works of a mechanical nature, all to the approval of the Engineer. The completion time (in weeks) quoted by the Tenderer must not make provision for any statutory or other holidays which may occur during the contract period. In determining the contractual completion date a week shall be taken to be five (5) working days (Saturdays and Sundays excluded).

The contractual completion date shall be postponed with a number of days equal to statutory holidays that fall on working days within the actual installation period.

The Contractor shall be responsible for commissioning the equipment which shall comprise putting it into operation, testing, calibration, proper adjustment of the equipment, and thoroughly running it. After the entire installation has been completed and the individual installations have been tested, the Contractor shall commission the equipment supplied and installed by him as required by the Engineer. After the works for each section, as agreed with the Engineer, has been put into operation, the Contractor shall operate the equipment installed under this contract for a continuous period of 14 successive days and simultaneously train the Employer's plant supervisors in the correct operation and maintenance thereof. The Certificate of completion shall only be issued if all the equipment within a section has passed the 14-day continuous test run and the Employer's plant supervisors have been sufficiently trained to continue with the operation of the plant. A Partial Certificate of completion refers to equipment within a section having passed the 14-day continuous test run and the Employer's plant supervisors have been sufficiently trained to continue with the operation of the plant.

The term "installation and commissioning" of material and equipment shall include the on-site handling, on-site transport, positioning, erection, connection, anchoring, installation and protection thereof, as well as the successful completion of all the specified tests on completion as defined under PS 5.7.2 and PS 5.7.3

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and the successful completion of the commissioning period, including the training of the Employees plant supervisors. The tendered rates shall cover all costs for installation and commissioning by the Contractor, including all cost of consumables, labour, erection gear, testing equipment, attendance, additional site visits and profit.

Section payments against each item in accordance with the progress of the work shall be made on a pro rata basis for up to seventy-five (75) percent of the amount tendered against each item on completion of installation and site testing, but with the 14 day continuous plant test pending.

No other payment for installation and commissioning of materials and equipment shall be considered other than that under the "installation and commissioning" items in the Schedule of Quantities.

PS 5.7.2 Testing

General

The Contractor shall be responsible for the completed installation passing any tests specified or required by the relevant Local Authority or ACT. The Engineer shall be entitled to be present at such test and the Contractor shall give the Engineer reasonable notice of the dates of the test. Where test certificates are required in terms of any clause of the Specifications or ACT, such certificates shall be submitted to the Engineer immediately after the relevant test have been completed and before the tested equipment is delivered, installed or commissioned as the case may be.

Before handing over the plant the Contractor must carry out tests as specified in detail in the various Sections. The entire cost of testing, including supply of test equipment must be borne by the Contractor and an adequate allowance for such tests must be made in the tendered price. The results of all performance tests shall be fully documented and copies in triplicate submitted to the Engineer prior to final acceptance of the equipment.

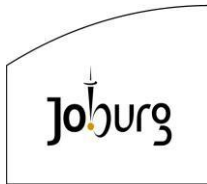
The Completion Date will be taken as the date on which the relevant portion of the plant as a complete unit is commissioned or when all the performance tests, have been completed to the satisfaction of the Engineer, whichever date is the later. Johannesburg Water will accept the plant in question on the completion date as herein defined.

Factory Tests

The Contractor shall carry out tests in accordance with the requirements of the recognised SANS, IEC or BS standards. Comprehensive details of the standards used, and to which equipment applicable, shall be supplied. Such additional tests in the manufacturer's "Works", which in the opinion of the Engineer are necessary to determine that the Contract work complies with the requirements of the Specification, whether under test conditions or in normal service, may be called for at no additional cost to the Employer.

Tests on Site

Employer:		Contractor:	
Witness:		Witness:	



All Site tests shall normally be carried out in the presence of, but always to the satisfaction of the Engineer and at such times as he may reasonably require. The Contractor shall provide all the relevant test equipment and bear the costs of all testing to be done. All equipment must be tested to ascertain whether it performs its intended duties in a manner as specified.

Accepted Laboratories

Unless otherwise stated in a specification that forms part of this Contract, only the testing laboratories of the South African Bureau of Standards, the Council of Scientific and Industrial Research, the relevant Government Departments and Local Authorities shall be accepted as approved laboratories in which tests or design work required in terms of a specification may be carried out.

Methods of Testing

Unless otherwise prescribed in a specification that forms part of this Contract, all testing shall be carried out and interpreted in strict accordance with the methods specified in relevant SANS, IE or BS Specification(s).

PS 5.7.3 Servicing

Without limiting in any way, the obligations or responsibilities of the Contractor for maintenance, the Contractor shall make regular quarterly visits to the plant during the maintenance period to supervise the maintenance of the plant. During these visits, he shall make all adjustments and do everything necessary to ensure the proper running of the plant. After each supervising visit to the Site, the Contractor shall submit to the Engineer a report on: -

- (a) The condition of the equipment and the servicing work carried out, and
- (b) Any adjustments which may have been made.

The last servicing visit shall be carried out during the last week of the maintenance period during which visit the Contractor's representative shall carry out full checks on the equipment to ensure that the alignment, clearances and any other setting are correct and he shall carry out any adjustments necessary. The maintenance period shall not terminate until the Engineer is satisfied that the Contractor has finally checked the adjusted equipment.

Servicing shall be measured as scheduled by the number of visits.

The tendered rate shall exclude the cost of providing lubricants but shall cover the cost of servicing visits and operation as specified above.

PS 5.8 Format of Communications

All communication shall be in writing. The format of all communication shall be as approved by JW. The address shall be as stated in the Contract data.

PS 5.9 Key Personnel

Tenderers shall state, in the format of a schedule, the posts for which he shall consider key personnel for the Site of Works. The number of such key personnel occupying the Site shall not be required at the tender stage. The Contractor once

Employer:		Contractor:	
Witness:		Witness:	



formally requested, by the Engineer, shall make available the contact details of all the key personnel on site.

The Contractor shall not withdraw from the Site of the Works any of his erection and installation staff until such time as the plant has been completely erected and installed, except with the written consent of the Engineer.

PS 5.10 Management Meetings

The Contractor shall be required to attend separate monthly management progress meetings. Minutes shall be kept by the Engineer who shall distribute such minutes to the Employer and the Contractor. The Contractor must include for attending technical meetings as and when required by the Engineer.

PS 5.11 Forms for Contract Administration

The Employer shall provide all standard forms for the administration of the contract. The Contractor shall be required to correspond on the standardized format.

PS 5.12 Daily Records

The Contractor shall be required to keep a daily on-Site record activity report. The activity report shall be submitted to the Engineer's Representative for signature on a daily basis. Daily records shall include all on site activities and progress made shall be kept by the Contractor. These records shall include all material deliveries for the day, personnel employed on the Site of Works, equipment delivered to site or storage and the number of man-hours for the week in question. Plant used during the on-site activities shall need to be recorded by the Contractor.

PS 5.13 Payment Certificates

Monthly payment certificates shall be submitted by the Contractor in the format approved by the Engineer.

Payment for particular items scheduled shall conform to the payment clauses of the Project Specifications and that of the Particular Specifications.

The tendered rates or sums shall cover the cost of drawings and instructions for anything not specially mentioned but obviously required, (e.g. all ancillaries, including all bolts, fastenings and brackets, safety guards and any work or material required for the proper installation of such equipment in complete working order), to enable the equipment as described to be installed and/or function safely and correctly as specified.

No claims whatever for extras shall be allowed on the grounds that a necessary piece of equipment or a part thereof is not specifically mentioned in the Schedule of Quantities.

Payment for "supply and delivery", "install and commission", "servicing" and "tools and spares" is respectively defined in PS 3.2, PS 5.7, and PS 6.7.

Before becoming entitled to any of the above payments, the Contractor shall lodge with the Engineer three copies of a detailed invoice showing the amount claimed

Employer:		Contractor:	
Witness:		Witness:	



as well as a claim form in triplicate complete by item as scheduled in a format approved by the Engineer.

Payment Certificates shall be delivered to The Engineer by the 10th of each month.

PS 5.14 Permits

Whatever import, transport, equipment certification permits etc are necessary for the completion of the Works to be carried out under this contract shall be the Contractor's responsibility to obtain.

PS 5.15 Recording of Weather and Abnormal Rainfall

No extension of time for completion will be granted on account of normal inclement weather, but extension of time shall be determined for abnormal rainfall or wet conditions in accordance with the formulae given below, separately for each calendar month or part thereof. It shall be calculated for the full period for completion of the Contract plus any granted extension thereof:

$$V = (Nw - Nn) R_w/R_n \dots\dots\dots f (Nw - Nn) > 0$$

The symbols shall have the following meanings respectively:

V = Extension of time in calendar days in respect of the calendar month under consideration.

Nw = Actual number of days during the calendar month on which a rainfall of 10 mm or more is recorded.

Nn = Average number of days, as derived from existing rainfall records, on which a rainfall of 10 mm or more has been recorded for the calendar month.

Rw = Actual rainfall in mm recorded for the calendar month.

Rn = Average rainfall in mm for the calendar month under consideration as determined from existing rainfall records.

When calculating extension of time for a part of a month pro rata values of Rn and Nn shall be used.

The factor R_w/R_n shall be deemed to be a fair allowance for days on which wet conditions disrupted or prevented work, but on which a rainfall of 10 mm or more was not recorded. If the value of R_w/R_n exceeds 2,5 it shall be taken as 2,5.

If Nw for any month is smaller than Nn, the formula used shall be.

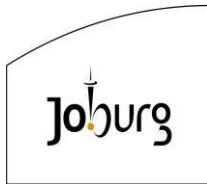
$$V1 = (Nn - Nw)$$

The total extension of time for completion shall be the sum of the values of V, minus the sum of the values of V1.

$$\text{Total extension of time} = \Sigma V - \Sigma V1$$

The following are the most reliable values of Nn and Rn available and shall be used unless other values are mutually agreed upon beforehand:

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Witness:		Witness:	



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MONTH	Nn	Rn	MONTH	Nn	Rn
January	4,6	124.9	July	0,1	3.2
February	3,0	104.3	August	0,1	5.9
March	3.2	96,2	September	0,8	24.0
April	1,4	39.3	October	2,2	70,9
May	0,3	13.2	November	3,5	100.7
June	0,1	5.2	December	3.7	111.8
YEARLY AVERAGE					699.5

Source of information: Weather Bureau, Department of Transport, Pretoria, for Sandton.

Accurate rain gauging shall be done at the offices of the Resident Engineer. This data will be regarded as the actual recorded rainfall for the Contract. The readings will be done by the Resident Engineer and the Contractor may attend when rainfall is being gauged.

Any extension of time determined in accordance with the above requirements shall be granted in terms of Clause 5.12 of the General Conditions of Contract, specifically Clause 5.12.2.2: Abnormal climatic conditions.

The Contractor shall allow in his rates and prices for all the effects of adverse weather conditions. In this regard the Contractor should note that all vehicles are susceptible to mobility difficulties in certain parts of the site except that which is prepared to receive traffic.

PS 6 FEATURES REQUIRING SPECIAL ATTENTION

PS 6.1 General Conditions of Contract (GCC)

Although the Contract comprises work which includes that of a mechanical, electrical and control and instrumentation nature, the Contract Document is compiled in accordance with the General Conditions of Contract for Construction Works, Third Edition (2015) and Tenderers are therefore required to price the Tender accordingly.

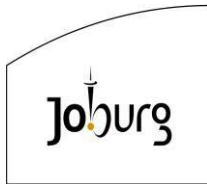
PS 6.2 Security

Though the security of the Northern Wastewater Treatment Works is outsourced by JW to a security company, **the Contractor shall make his own arrangements to secure the on-site facilities provided for the execution of the Contract.** The Contractor's required security arrangements shall cover all his works, materials, plant and equipment, site camp and personnel.

PS 6.3 Schedule of Quantities for Mechanical Work

The schedules for the mechanical works differentiate between the supply and delivery of equipment and the installation and commissioning thereof so as to avoid delays in payment after equipment has been supplied and to improve the

Employer:		Contractor:	
Witness:		Witness:	



Contractor's cash flow. The installation and commissioning items shall therefore not be paid for under materials on site.

It is an explicit requirement of the Contract that specialist contractors are approached for the electrical, control and instrumentation works as required to undertake the works.

PS 6.4 Additional Meetings

The costs of all additional meetings or inspections over and above the normal, that take place because of the Contractor not keeping to his program or because of the quality of his work shall be for the account of the Contractor and shall be deducted from the following payment certificate. An amount of R 5 000.00 per meeting shall be paid by the Contractor to compensate for the travelling cost, time, etc. of both the Engineer and the Employer.

PS 6.5 Certificate of Completion

The Certificate of Completion shall be issued after the successful commissioning of all equipment as described in PS 5.7. The twelve months defects liability period shall start on the date stated in the Certificate of Completion.

Guarantees shall be reduced or returned to the Contractor after issuing of the Certificate of Completion and retention monies shall be paid out after the defects liability period has elapsed. The Certificate of Completion shall not be issued until the documents required in terms of this Contract have been lodged with and accepted as satisfactory by the Engineer.

The issuing of the Certificate of Completion could be delayed if the equipment supplied under this contract cannot be commissioned. If the issuing of the Certificate of Completion is delayed for reasons beyond the Contractor's control, the Contractor shall be compensated for his expenses because of the time delay between the completion of the works and the commissioning of the equipment. The rate tendered for the payment item for the postponement of the issuing of the Certificate of Completion must include for all the Contractor's expenses.

Measurement and Payment

Unit

Compulsory postponement of the issuing of the Certificate of Completion Rate/day

PS 6.6 Foreign Exchange Risks

The provision of forward cover against foreign exchange fluctuations on the imported content of all equipment required under the contract might be required. In his Tender, the Tenderer must state the value of the imported content of each item and the applicable currencies and the exchange rates on which his tender was based.

The successful Tenderer might be required to take out forward cover on all foreign exchange transactions required in his tender for this contract, the rate applied shall be that ruling at the date of commencement of the Contract when that is stated in the Letter of Acceptance.

Employer:		Contractor:	
Witness:		Witness:	



Amounts tendered shall be adjusted for foreign exchange variations up to the date for commencement of the Contract; any fluctuations after this date shall be for the Contractor's account.

PS 6.7 Tools and Spares

As part of the equipment supplied, the Contractor shall supply all special tools or keys required for adjustment to any parts of such equipment.

The Contractor shall supply such spares ordered by the Engineer.

The cost of special tools and keys shall be covered by the tendered rate or price for the Supply Items of the relevant equipment.

Payment for spares and standard spanners and cabinet(s) shall be made from the Prime Cost Sum allowed in the Schedule of Quantities for such items. The Contractor's profit, administration and delivery charges shall be paid at the tendered percentage of the actual purchase price of the goods.

PS 6.8 Operation Manual

The Contractor must compile and provide three copies of a complete operation manual for the equipment provided. This manual shall contain comprehensive information as set out hereafter.

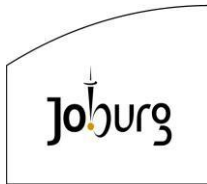
- (a) Drawings of the equipment detailing all part numbers and materials.
- (b) A complete spare list.
- (c) A lubrication and maintenance schedule showing all maintenance and lubrication operations, their recommended frequency and the grades of lubricant required.
- (d) A maintenance brochure describing all maintenance, adjustment, and replacement procedures.
- (e) Operating manual describing the operation of the equipment with performance curves where applicable.
- (f) A manual detailing all dismantling and reassembly procedures.
- (g) Maintenance procedure for corrosion protection painting systems.
- (h) Complete Data book of the equipment on completion of the Contract.

The Contractor shall amplify and amend such drafts until the Engineer is satisfied that they shall fulfil the purpose of ensuring that the Employer's staff is adequately instructed to operate and maintain the works. Once the drafts have been approved by the Engineer, the Contractor shall prepare three suitably bound copies and deliver them to the Engineer.

The manuals shall be drawn up in English.

In addition to the above, the Contractor, and where necessary the suppliers of equipment, shall be required to instruct the works personnel in the proper and correct operation of the equipment installed for a maximum period of 1 day. The

Employer:		Contractor:	
Witness:		Witness:	



timing of this training shall be determined in consultation with the Employer and the Engineer.

Mechanical, Electrical, and C&I Requirements for as built drawings

All duly signed As Built Drawings are to be submitted in a transparent plastic format as supplied by REGMA or similar.

Transparent plastic specification for 914 mm x 45 m rolls.

Type: Hydromat 08.

Transparencies may be submitted in size A1 provided they are legible. It is permissible to submit transparencies in size A0 if that is the size of the original. Electronic copies of all duly signed drawings are to be submitted in Auto CAD format.

In addition to the above a bound volume in A3 paper prints of all Electrical drawings are to be supplied.

PS 6.9 General

PS 6.9.1 Abbreviations

Wherever abbreviations for published national Standard Specifications or named Standard Specifications are used, they shall be deemed to refer to the latest edition of the Specification concerned, including all amendments, published 30 days before the closing date for receipt of tenders. Typical abbreviations are:-

ASTM : American Society for Testing Materials
BS : British Standard
BSCP : British Standard Code of Practice
SANS : South African National Standards
SIS : Standards Institute Sweden
IEC : International Electrotechnical Commission

PS 6.9.2 Metric Symbols

Symbols prescribed by the System Internationale (SI) are used in these Specifications.

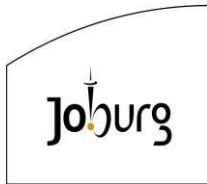
PS 6.9.3 Definitions

OHS ACT : Occupational Health and Safety Act, 1993 (Act 85 of 1993), as amended and including any regulations made thereunder.

PS 6.9.4 SANS Standard

All materials used and the standards of workmanship employed for the execution of the Works shall comply with the appropriate SANS Standard and or Code and if they do not carry the SANS mark, the Contractor shall obtain a certificate from SANS stating that the items comply with the appropriate SANS standard.

Employer:		Contractor:	
Witness:		Witness:	



PS 6.10 Installation of Equipment

PS 6.10.1 Safety

The Contractor shall at all times observe proper and adequate safety precautions on the Site. Where adequate, safety precautions are not being observed, the Engineer may order the Contractor to comply with minimum safety requirements at the Contractor's expense and compliance with such an order shall not absolve the Contractor from any of his responsibilities and obligations under the Contract and the Occupational Health and Safety Act.

PS 6.10.2 General

A skilled erector shall be in charge of the work at all times and any instructions and explanations which the Engineer shall give to him, shall be deemed to have given the Contractor.

The work shall be neat and workmanlike true to line and level, plumb and in proper working order.

Where any item of plant is mounted on a frame or bed plate, packers of 10 mm minimum thickness machined to size shall be provided and fitted by the Contractor to ensure accurate alignment.

Where required to correct alignment, all mounted units shall be shimmed with non-corrosive metal shims. Shims shall be the shape and size as the contact area of the parts and slotted so that the shims can be removed without removing the mounted bolts.

All cut edges shall be without burrs. Shims with wrinkles in the material shall not be permitted.

Only small lugs shall protrude after completion.

All equipment shall be properly assembled and mounted to avoid the setting up of initial stresses in the materials and to ensure perfectly free running of all moving parts.

PS 6.11 Operation of Valves

The Contractor may not operate any valves, sluice gates or any other equipment currently in use on the works without permission from the Works Manager

PS 6.12 Work Outside Normal Working Hours

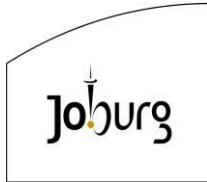
Should the Contractor wish to work outside normal working hours (Monday to Friday 07h00-17h00) he is to obtain permission from the Engineer. This permission shall not be unreasonably withheld.

PS 6.13 Community Liaison and Community Relations

See Clause 1.4 of the Environmental Management Plan forming part of this document.

The Contractor shall in consultation with the local ward counsellor employ a full time Community Liaison Officer for the duration of the contract.

Employer:		Contractor:	
Witness:		Witness:	



PS 6.14 Employment of Local Labour

The Contractor shall make every effort to employ staff from the local communities within the Johannesburg Metropolitan Area. Skilled workers may only be brought in from outside the local communities if such personnel are not available locally. The Contractor shall pursue a programme of recruitment and training of persons from the local communities. The Contractor shall carry out a training programme for the duration of the construction process for local staff employed or to be employed by him on the site. Apart from satisfying the immediate requirements for unskilled labour, the development of the proficiency of these staff in semi-skilled and skilled categories such as carpenters, steelfixers, shutter hands, drivers, clerks etc. is required: The minimum total number of man days of work provided to the community, local to the construction site, shall be 792 for the contract.

The contractor must provide EPWP information on the required format on a monthly basis.

PS 7 HEALTH AND SAFETY SPECIFICATION FOR CONSTRUCTION WORK

Tendering Contractors are to prepare Health and Safety Plans in accordance with Johannesburg Water's Health and Safety Specification (refer to Volume 2: Occupational Health and Safety Specification and Environmental Management Plan for Capital Investment Projects). The legal imperatives for this requirement stem from the Construction Regulations (2014), and more specifically the following:

Regulation 5(1)(b): A client must prepare a suitable, sufficiently documented and coherent site-specific health and safety specification for the intended construction work based on the baseline risk assessment.

Regulation 5(1)(f): A client must include the health and safety specification in the tender documents.

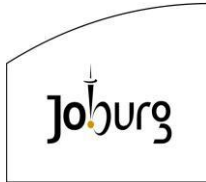
Regulation 5(1)(i): A client must discuss and negotiate with the principal contractor the contents of the principal contractor's health and safety plan contemplated in regulation 7(1) and must thereafter finally approve that plan for implementation.

Regulation 5(1)(m): A client must ensure that a copy of the principal contractor's health and safety plan is available on request to an employee, inspector, or contractor.

Regulation 5(1)(n): take reasonable steps to ensure that each contractor's health and safety plan is implemented and maintained.

Regulation 7(1)(a): A principal contractor must provide and demonstrate to the client a suitable, sufficiently documented, and coherent site-specific health and safety plan, based on the client's documented health and safety specifications, which must be applied from the date of commencement of and for the duration of the construction work and which must be reviewed and updated by the principal contractor as work progresses.

Employer:		Contractor:	
Witness:		Witness:	



Regulation 7(1)(b): A principal contractor must open and keep on site a health and safety file, which must include all documentation required in terms of the Act and these Regulations, which must be made available on request to an inspector, the client, the client's agent or a contractor.

PS 7.1 Project-related Occupational Health and Safety Risks

According to the Construction Regulations (2014), a Health and Safety Plan “means a site, activity or project specific documented plan in accordance with the client's health and safety specification”. Apart from complying with the Health and Safety Specification (Volume 2), specific attention is drawn to the identification and assessment of risks. The tendering Contractors are required to consider *inter alia* the following risks (where applicable):

Project- and site-specific risks:

- Excavation and safeguarding of trenches;
- Working in confined spaces;
- Working next to roads;
- Traffic control;
- Plant and machinery operation;
- Existing services;
- Offloading of material;
- Overhead power lines;
- Hand tools;
- Laying of pipes;
- Laying of cable trays and cables;
- Machine operator;
- Third party exposures;
- Use of portable electrical tools;
- Location of site camp;
- Levelling of materials;
- Storage and handling of material;
- Storage of hazardous materials;
- Fire prevention and protection;
- Fuel supply;
- Refuelling vehicles/plant;
- Welding;
- Gas welding and cutting operations;
- Handling of compressed gas cylinders;
- Handling of asbestos;
- Aggregate/Sand Delivery;
- Form and Support work;
- Landscaping;
- Lifting equipment;
- Loading/unloading supervision;
- Material delivery;
- Material handling;

Employer:		Contractor:	
Witness:		Witness:	



- Installing cable mounting poles;
- Gas explosions;
- Excavator;
- Drivers – of vehicles;
- Electrical Distribution boards;
- Demolitions;
- Corrosive liquids;
- Other contractors;
- Hand drills;
- Pedestal Drills;
- Bench grinders;
- Pedestal Grinders;
- Placing concrete;
- Portable ladders;
- Scaffolding;
- Site Establishment;
- Working on elevated positions;
- Working close to existing services i.e. electrical, water, etc;
- Working close to water and on bridges;
- Working with pressure vessels under pressure;
- Workshops;

Safe work and emergency procedures need to be prepared to address the abovementioned risks.

PS 7.2 Guide to risk assessments

Nine steps to Effective Risk Assessments

- Step 1 Identifying the current as well as emerging hazard, risks, or exposures.
- Step 2 Aim to identify major hazards, don't waste time on the minor and detail except if such hazard has the potential be repeat itself on a frequent basis.
- Step 3 Involve as many people as possible in the ongoing risk assessment process especially those at risk.
- Step 4 Gather all the information and analyze it.
- Step 5 Look at what could or has occurred including non-routine operations.
- Step 6 Use a systematic approach to ensure all hazards are adequately addressed.
- Step 7 Assess the risks identified or the risk has occurred by considering the effectiveness of current as well as controls under consideration.
- Step 8 Ensure the process is practical, realistic, cost and business effective.

Employer:		Contractor:	
Witness:		Witness:	



Step 9 Always record the assessment in writing including i.e. assumptions, date and why a particular decision has been made.

How serious is it?

Probability

- A Common
- B Has Happened
- C Could Happen
- D Not Likely
- E Practically impossible

Consequences

- 1 Fatality or permanent disability.
- 2 Major injury.
- 3 Average Lost Time Injury.
- 4 Minor Injury.
- 5 Medical Treatment or less.

		Probability				
		A	B	C	D	E
Consequence	1	1	2	3	4	5
	2	2	3	4	5	6
	3	3	4	5	6	7
	4	4	5	6	7	8
	5	5	6	7	8	9

Risk rating	Action
1 - 3 = Serious	Immediate (within 1 week).
4 - 5 = High	Within 1 month.
6 - 7 = Moderate	> 4 weeks.
8 - 9 = Acceptable	No action but shall consider from time to time.

PS 8 ENVIRONMENTAL PLAN

Tendering Contractors are to adhere to the mitigation measures listed in the Environmental Management Plan (EMP) (refer to Volume 3: Occupational Health and Safety Specification and Environmental Management Plan as well as Environmental Management Programme). Environmental mitigation measures are actions needed to align a project implementation phase with environmental control principles, where potential impacts to the natural and social environment are prevented, minimised or remediated. Environmental safeguarding is governed by various sets of legislation, with the most noteworthy for this project constituting the National Environmental Management Act (No. 107 of 1998) and the National Water Act (No. 36 of 1998).

Employer:		Contractor:	
Witness:		Witness:	



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MECHANICAL AND ELECTRICAL EQUIPMENT



Volume 2A Scope of Work

PS 9 PORTION 2: PARTICULARS OF REQUIRED MECHANICAL WORK

This specification is to be read in conjunction with the Standardised Particular Specifications detailed in clause PS 4.2 - Particular Specifications as well as the drawings included in Volume 4 of the tender document.

The Portion 2 and the Bill of Quantities is split into the following sections.

- Section 1 - Preliminary schedules
- Section 2 - Mechanical surface aerators
- Section 3 - Mechanical vertical shaft mixers
- Section 4 - Mechanical equipment for MLSS recirculation pumps
- Section 5 - Mechanical equipment for RAS recirculation pumps
- Section 6 - Mechanical equipment for Primary settling tanks
- Section 7 - Mechanical equipment for Secondary settling tanks
- Section 8 - Mechanical equipment for WAS Thickeners
- Section 9 - Mechanical equipment for Fermentation Tanks
- Section 10 - Mechanical equipment for Ferric Storage and Dosing
- Section 11 - Mechanical equipment for Disinfection
- Section 12 - Mechanical equipment for Pump Stations
- Section 13 - Mechanical equipment for Odour Control
- Section 14 - Mechanical equipment for exisytng HOW

Drawing References

General details pertaining to the works is given on the following drawings included in Volume 4 of the tender document.

DRAWINGS REQUIRED FOR MECHANICAL TENDER	
Description	Drawing No
GENERAL	
LIST OF DRAWNGS	303000141/12-001
SITE PLAN	303000141/12-006
PROJECT NOTICE BOARDS	303000141/12-007
PROCESS AND INSTRUMENTATION DRAWINGS	
LEGEND	303000141/12-021
PRIMARY SEDIMENTATION TANKS	303000141/12-022
SLUDGE FERMENTATION PLANT	303000141/12-023
WASTE SLUDGE THICKENERS	303000141/12-024
BALANCING TANK	303000141/12-025
REACTOR 2	303000141/12-026
FERROUS AND FERRIC DOSING PLANTS	303000141/12-027

Employer:		Contractor:	
Witness:		Witness:	



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DISINFECTION DOSING PLANT	303000141/12-028
ONLINE MONITORING OF FINAL AND REACTOR EFFLUENT	303000141/12-029
SLUDGE FERMENTATION ODOUR CONTROL PLANT	303000141/12-038
LAYOUTS	
SITE LAYOUT GENERAL ARRANGEMENT	303000141/12-041
ARCHITECTURAL	
HYPOCHLORITE PUMPSTATION BUND & PUMPS	303000141/12-073
ELUTRIATION PUMP STATION	303000141/12-074
EFFLUENT PUMP STATION CONCRETE AND BUILDING LAYOUT	303000141/12-081
PRIMARY SEDIMENTATION TANKS — STRUCTURAL	
PRIMARY SEDIMENTATION TANKS SHEET 1 OF 2	303000141/12-111
PRIMARY SEDIMENTATION TANKS SHEET 2 OF 2	303000141/12-112
FERMENTATION TERRACE STRUCTURAL	
FERMENTATION THICKENER	303000141/12-141
ELUTRIATION PUMPSTATION	303000141/12-150
MIXING TANK	303000141/12-154
EXTENSION TO EXISTING ELUTRIATION PUMP STATION	303000141/12-157
FERMENTATION TERRACE PIPEWORK	
FERMENTATION TERRACE ELUTRIATION EFFLUENT & THICKENED SLUDGE PIPES	303000141/12-171
BALANCING TANK STRUCTURAL	
BALANCING TANK SHEET 1 OF 5	303000141/12-201
BALANCING TANK SHEET 3 OF 5	303000141/12-203
REACTOR - STRUCTURAL	
REACTOR DETAILS OF INTERNAL WALLS SHEET 1 OF 3 AND RECYCLE A PUMPSTATION	303000141/12-303
REACTOR DETAILS OF INTERNAL WALLS SHEET 2 OF 3	303000141/12-304
REACTOR DETAILS OF INTERNAL WALLS SHEET 3 OF 3 AND RECYCLE B PUMPSTATION	303000141/12-305
REACTOR PLATFORMS AND BRIDGES	303000141/12-306
REACTOR FLOOR SLAB	303000141/12-307
REACTOR PLATFORM AND BRIDGES	303000141/12-309
REACTOR ARCHIMEDES SCREW PUMPSTATION	303000141/12-312
REACTOR ARCHIMEDES SCREW PUMPSTATION	303000141/12-313
CLARIFIERS — STRUCTURAL	
CLARIFIER SHEET 1 OF 2	303000141/12-401
CLARIFIER SHEET 2 OF 2	303000141/12-413
CLARIFIERS — PIPEWORK	
CLARIFIER TERRACE FEED PIPES	303000141/12-434
EFFLUENT DISPOSAL — PIPEWORK	
DISINFECTION CONTACT TANK LAYOUT OF STEEL PIPES	303000141/12-473
EFFLUENT PUMP STATION	
EFFLUENT PUMPSTATION	303000141/12-485
WASTE SLUDGE TREATMENT — STRUCTURAL	

Employer:		Contractor:	
Witness:		Witness:	



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Volume 2A Scope of Work

WASTE SLUDGE THICKENER	SHEET 1 OF 2	303000141/12-508
WASTE SLUDGE THICKENER	SHEET 2 OF 2	303000141/12-509
OTHER DETAILS		
NEW ELUTRATION PUMPSTATION - MECHANICAL		303000141/12-160
EXISTING ELUTRATION PUMPSTATION - MECHANICAL		303000141/12-161
EXISTING WAS PUMPSTATION - MECHANICAL		303000141/12-162

PS 9.1 SECTION 1 – PRELIMINARY AND GENERAL ITEMS

Section 1 of the Bill of Quantities covers P and G's for mechanical and electrical works and the Tenderer is to complete all items.

In certain cases, PC sums have been included to cater for selected works that will be determined and approved by the Engineer prior to the work being executed by the contractor.

The tenderer is to take note of the provision for a monthly rate for the maintenance of the mechanical equipment to be supplied under this contract for a period 12 months.

The rate should include for all costs associated with the maintenance of the equipment and will include (but not limited to) the following.

- Maintenance shall be done in accordance with the details included in the detailed operation and maintenance manuals.
- Monthly maintenance check schedules to cover the maintenance requirements of the O&M manuals.
- Monthly reports outlining the findings during the maintenance visits.
- Travel costs to and from site.
- The necessary artisans and labour to cover the maintenance responsibilities.
- Normal consumables required for the proper maintenance of the equipment and shall include (but not restricted to) oil, grease etc.

PS 9.2 SECTION 2 – MECHANICAL SURFACE AERATORS

PS 9.2.1 Particular Specifications

This specification shall be read in conjunction with the Particular Specification, M06: Mechanical Aeration Equipment, M08: Mechanical Gearboxes and G02: Corrosion Protection.

PS 9.2.2 Drawing References

The details pertaining to the reactor where the aerators are to be installed is given on the following drawings included in Volume 4 of the tender document.

P&ID Reactor 2 –..... Drawing Number 30300141/12-026

Reactor 2 details of internal walls sheet 1 – ... Drawing Number 30300141/12-303

Employer:		Contractor:	
Witness:		Witness:	



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Volume 2A Scope of Work

Reactor 2 details of internal walls sheet 2 – ... Drawing Number 30300141/12-304

Reactor 2 details of internal walls sheet 3 – ... Drawing Number 30300141/12-305

Reactor 2 platform and bridges – Drawing Number 30300141/12-306

Reactor 2 floor slab layout and details – Drawing Number 30300141/12-307

Reactor 2 platform and bridges – Drawing Number 30300141/12-309

PS 9.2.3 Scope of Work

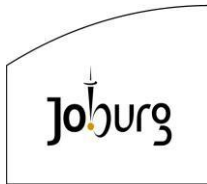
Mechanical surface aerators in accordance with the general specification M06 – Mechanical Aeration Equipment are to be supplied for installation in the various aeration zones of the Bio Reactor with the associated volumes as detailed in the following tables.

Aeration Zone	Number of Aerators	Power (kW)	Total Volume (m ³)
Zone 1	3	110	4 886
Zone 2	2	110	3015
Zone 2	2	90	3015
Zone 3	2	90	3 257
Zone 3	1	75	1 629
Zone 4	3	22	2 177

The surface dimensions and water depth of each zone is given in the following table. The tender is requested to confirm that the equipment that they offer shall be able to operate in the specific zone without vortexing, wave action and/or any undue loading on the gearbox or support structure.

AERATORS						
Zone No	Descriptions	Liquid containment				Motor size
		Length	Breadth	Depth	Volume	
		m	m	m	m ³	
Aer. 1	Aerobic	17.46	17.6	5.3	1629	110
Aer. 1	Aerobic	17.46	17.6	5.3	1629	110
Aer. 1	Aerobic	17.46	17.6	5.3	1629	110
Aer. 2	Aerobic	17.46	15.2	5.3	1407	110
Aer. 2	Aerobic	17.46	15.2	5.52	1465	110
Aer. 2	Aerobic	17.46	17.6	5.3	1629	90
Aer. 2	Aerobic	17.46	17.6	5.3	1629	90

Employer:		Contractor:	
Witness:		Witness:	



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Volume 2A Scope of Work

Aer. 3	Aerobic	17.46	17.6	5.3	1629	90
Aer. 3	Aerobic	17.46	17.6	5.3	1629	90
Aer. 3	Aerobic	17.46	17.6	5.3	1629	75
Aer. 4	Aerobic	11.73	11.67	5.3	726	22
Aer. 4	Aerobic	11.73	11.67	5.3	726	22
Aer. 4	Aerobic	11.73	11.67	5.3	726	22

Where anti-vortex baffles are required to prevent vortex formation, details of the baffle requirements must be provided with the tender. The Tenderer must state in his tender whether the baffles are required and must be provided for by the Tenderer in the tendered rates for the aerator to which the baffles are to be fitted. Details of the materials and construction of the baffles must be submitted with the tender.

As indicated on the layout and P & ID drawings, allowance has been made for the installation of 13 aerators.

Aeration control shall be affected by switching aerators on or off in response to signals from dissolved oxygen (DO) probes. The aerators offered must be able to withstand the frequent on/of switching without undue stress on the equipment offered.

Tenderers must indicate the pumping capacity of the offered aerators in the technical data sheets and state whether the flow of the liquid streams are radial at the aerator outlet. Tenderers must submit full details of each turbine characteristic and what affect various submergences have on their aeration assemblies.

Tenderes must submit a reference list of aerator installation covering where appropriate local, national, and international installations.

Portable Lifting Frame

The tender is to include for the design and supply of one only portable lifting frame complete with manual block and tackle to facilitate the removal of the motors and gearboxes for maintenance purposes.

The lifting frame shall be designed by the contractor to lift the complete weight of the 110kw aerators and be capable of fitting between the hand railings of the access platforms as shown on the drawings.

The wheels shall have a minimum diameter of 250mm with neoprene treads and have at least two wheels that swivel.

The tender is to include for a manually operated trolley for transporting the aerator gerabox and motors to the end of the platform. The wheels shall have a minimum diameter of 250mm with neoprene treads and have at least two wheels that swivel.

Civil Works

Employer:		Contractor:	
Witness:		Witness:	



The contractor shall be responsible for the screeding and grouting of the installation of all the mechanical equipment and an item has been included in the Bill of Quantities for this work.

PS 9.2.4 Measurement and Payment

Measurement items have been provided under the design, supply and delivery and the install and commission section of the Schedule of Quantities.

The rate tendered for the items shall further include for the labour, material, replacement parts, transport, new fasteners, sand blasting, corrosion protection, testing and commissioning of the Mechanical Aeration Equipment and double handling to ensure compliance with the relevant clauses of the Project and Particular Specifications.

PS 9.3 SECTION 3 - MECHANICAL VERTICAL SHAFT MIXERS

PS 9.3.1 Particular Specifications

This specification shall be read in conjunction with the Particular Specification, M04 Mechanical Equipment for the Balancing Tank, M05: Mechanical Anaerobic and Anoxic Mixing Equipment, M08: Mechanical Gearboxes and G02: Corrosion Protection.

PS 9.3.2 Drawing References

The details pertaining to the reactor where the mixers are to be installed is given on the following drawings included in Volume 4 of the tender document.

P&ID Sludge fermentation plant – Drawing Number 30300141/12-023

P&ID Balancing Tank – Drawing Number 30300141/12-025

P&ID Reactor 2–..... Drawing Number 30300141/12-026

Fermentation mixing tank -..... Drawing Number 30300141/12-154

Balancing tank GA sheet 1 -..... Drawing Number 30300141/12-201

Balancing tank GA sheet 3 -..... Drawing Number 30300141/12-203

PS 9.3.3 Scope of Work

Mechanical vertically mounted mixers in accordance with the general specification are to be supplied for installation in the zones with the associated volumes as detailed in the following table.

Zone	Number of Mixers	Power (kW)	Volume (m ³)
Pre-Anoxic	1	7.5	1 173
Anaerobic	4	7.5	4 931
Anoxic	4	11	6 785

Employer:		Contractor:	
Witness:		Witness:	



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Volume 2A Scope of Work

Aeration Zone 3	1	15	1 401
Balancing Tank	6	11	9 801

The surface dimensions and water depth of each zone is given in the following table. The tenderer is requested to confirm that the equipment that they offer shall be able to operate in the specific zone without vortexing, wave action and/or any undue loading on the gearbox or support structure.

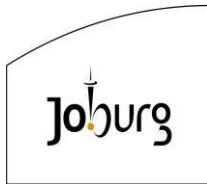
Zone	Liquid containment				Motor size
	Length	Breadth	Depth	Volume	
	m	m	m	m ³	kW
Pre-Anoxic	17.46	15.2	4.42	1173	7.5
Anaerobic	17.46	15.2	4.72	1253	7.5
Anaerobic	17.46	15.2	4.72	1253	7.5
Anaerobic	17.46	15.2	4.72	1253	7.5
Anaerobic	17.46	15.2	4.42	1173	7.5
Anoxic	17.46	17.6	5.52	1696	11
Anoxic	17.46	17.6	5.52	1696	11
Anoxic	17.46	17.6	5.52	1696	11
Anoxic	17.46	17.6	5.52	1696	11
Aerobic	17.46	17	4.72	1401	15

BALANCING TANK MIXERS			
Zone No	Descriptions	Volume	Motor size
		m ³	kW
P1	Balancing Tank	1878	11
P2	Balancing Tank	1360	11
P3	Balancing Tank	1670	11
P4	Balancing Tank	1890	11
P5	Balancing Tank	1345	11
P6	Balancing Tank	1658	11

FERMENTATION MIXING TANK MIXERS				
LOCATION	NO OF MIXERS	INSTALLED POWER PER MIXER (kW)	MIXING INTENSITY	VOLUME
			W/m ³	m ³
Fermentation Mixing Tank 1	1	7.5	22	250
Fermentation Mixing Tank 2	1	7.5	22	250

It is to be noted that upper impellers as specified in the Particular Specification, M05: Mechanical Anaerobic and Anoxic Mixing Equipment are not required for the

Employer:		Contractor:	
Witness:		Witness:	



mixers in the balancing tank as well as the sludge mixers in the Fermentation mixing tanks.

The tenderer should include in the rates for computer simulation modelling (Computational Fluid Dynamics) for the balancing tank to confirm adequate mixing taking place in the overall basin.

Performance testing after initial commissioning - The amperage drawn by each mixer assembly shall be used to calculate that the shaft to water mixing intensity is achieved. Should any mixer fail the test they shall be modified / changed at the contractor's expense. The method of calculation the shaft to water mixing intensity based on the amperage drawn shall be submitted to the engineer for approval prior to conducting the tests.

The following alterations to the Particular specification M05 shall be applicable.

- Clause M05.4.3 – Mixer Shaft shall be constructed in type 316 stainless steel.

Portable Lifting Frame

The tenderer is to include for the design and supply of one only portable lifting frame complete with manual block and tackle to facilitate the removal of the motors and gearboxes on the balancing tank for maintenance purposes.

The lifting frame shall be designed by the contractor to lift the complete weight of the 11kw mixers and be capable of fitting between the hand railings of the access platforms as shown on the drawings.

The wheels shall have a minimum diameter of 250mm with neoprene treads and have at least two wheels that swivel.

The tender is to include for a manually operated trolley for transporting the aerator gearbox and motors to the end of the platform. The wheels shall have a minimum diameter of 250mm with neoprene treads and have at least two wheels that swivel.

Civil Works

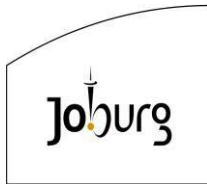
The contractor shall be responsible for the screeding and grouting of the installation of all the mechanical equipment and an item has been included in the Bill of Quantities for this work.

PS 9.3.4 Measurement and Payment

Measurement items have been provided under the design, supply and delivery and the install and commission section of the Schedule of Quantities.

The rate tendered for the items shall further include for the labour, material, replacement parts, transport, new fasteners, sand blasting, corrosion protection, testing and commissioning of the Mechanical Mixing Equipment and double handling to ensure compliance with the relevant clauses of the Project and Particular Specifications.

Employer:		Contractor:	
Witness:		Witness:	



PS 9.4 SECTION 4 - MECHANICAL EQUIPMENT FOR MLSS RECIRCULATION PUMPS

PS 9.4.1 Particular Specifications

This specification shall be read in conjunction with the Particular Specification, M07: Propeller Pumping Equipment, M08: Mechanical Gearboxes and G02: Corrosion Protection.

PS 9.4.2 Drawing References

The details pertaining to the reactor where the recirculation pumps are to be installed is given on the following drawings included in Volume 4 of the tender document.

P&ID Reactor 2–Drawing Number 30300141/12-026 Reactor No 2 – recycle “A” pump Drawing Number 30300141/12-303

Reactor No 2 – recycle “B” pump Drawing Number 30300141/12-305

PS 9.4.3 Scope of Work

Propeller type MLSS Recirculation (Lifting) pumps in accordance with the general specification are to be supplied for installation in the areas as detailed in the following table and shown on the drawings included in Volume 3 of the tender document.

Recycle	Zone to Zone	Number of Pumps	Pump Capacity ℓ/s each
a	Aerobic Zone 3 to Anoxic	2	1 160
b	Anaerobic to Pre-Anoxic	2	290

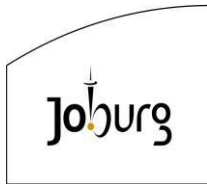
Recycle	Zone to Zone	Number of Pumps	Pump Operating head
a	Aerobic Zone 3 to Anoxic	2	580 - 560mm
b	Anaerobic to Pre-Anoxic	2	440 - 200mm

Each pump is to be supplied with a flap gate on the pump inlet to act as a non return valve to suit the pumps offered by the tenderer.

Both the (a) and (b) recycle pumps are to be fitted with a crawl beam and chain operated hoist and cross travel for installation and maintenance of the pumps. The crawl beam shall be supported by an “A” type frame sized and designed by the Contractor to lift the complete weight of the pumps offered.

Lifting Gantry

Employer:		Contractor:	
Witness:		Witness:	



A rate has been included in the bill of quantities for a fixed structural lifting frame complete with block and tackle for recirculation pumps “A” and “B” and the tender is to include for the design, manufacture, delivery, and installation in the rate submitted.

Civil Works

The contractor shall be responsible for the screeding and grouting of the installation of all the mechanical equipment and an item has been included in the Bill of Quantities for this work.

PS 9.4.4 Measurement and Payment

Measurement items have been provided under the design, supply and delivery and the install and commission section of the Schedule of Quantities.

The rate tendered for the items shall further include for the labour, material, replacement parts, transport, new fasteners, sand blasting, corrosion protection, testing and commissioning of the Propeller Type Pumping Equipment and double handling to ensure compliance with the relevant clauses of the Project and Particular Specifications.

PS 9.5 SECTION 5 - MECHANICAL EQUIPMENT FOR RAS RECIRCULATION PUMPS

PS 9.5.1 Particular Specifications

This specification shall be read in conjunction with the Particular Specification, M09: Mechanical Archimedean Screw Pumps Equipment and M08: Mechanical Gearboxes and G02: Corrosion Protection.

PS 9.5.2 Drawing References

The details pertaining to the civil structure where the RAS recirculation Archimedean Screw Pumps are to be installed is given on the following drawings included in Volume 4 of the tender document.

P&ID Reactor 2.....Drawing Number 30300141/12-026T

Archimedes screw PS layout and plans Drawing Number 30300141/12-312T

Archimedes screw PS details & sections - .. Drawing Number 30300141/12-313T

PS 9.5.3 Scope of Work

Archimedean type RAS Recirculation pumps in accordance with the general specification M09 – Mechanical Archimedean Screw Pumps Equipment are to be supplied for installation in the RAS pump station with the capacity as detailed in the following table. The detail of the RAS pump station is shown on the drawings

Employer:		Contractor:	
Witness:		Witness:	



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included in Volume 4 of the tender document and tenderers are referred to these drawings for the lift details of the screw pumps.

Recycle	Zone to Zone	Number of Pumps	Pump Capacity ℓ/s each
S	Return Sludge to Pre-anoxic	2	580

The RAS recirculation pump station has been designed to accommodate two screw pumps. The two pumps to be supplied under this contract will be operated on a duty/duty basis and shall comply with the following:

- a) Screw diameter = 1 600 mm
- b) Angle of inclination = 35 degrees
- c) Height from touch point to chute point = 4.0 m

Tenderers should note that the General specification provides for bottom bearings to be provided as seal for life bearings (being the preferred) how ever if tenderers offer continuous lubricated bearings they are to note that the grease pipe to the bottom bearing is to be mounted in a mild steel galvanised conduit mounted on the concrete structure to protect the grease pipe from damage. The conduit is to be installed as close as possible to the bottom bearing to keep the length of the exposed grease pipe as short as possible. The final route of the conduit is to be agreed by the Engineer prior to installation.

Civil Works

The contractor shall be responsible for the screeding and grouting of the installation of all the mechanical equipment and an item has been included in the Bill of Quantities for this work.

PS 9.5.4 Measurement and Payment

Measurement items have been provided under the design, supply and delivery and the install and commission section of the Schedule of Quantities.

The rate tendered for the items shall further include for the labour, material, replacement parts, transport, new fasteners, sand blasting, corrosion protection, testing and commissioning of the Archimedeian Screw Pumping Equipment and double handling to ensure compliance with the relevant clauses of the Project and Particular Specifications.

PS 9.6 SECTION 6 – MECHANICAL EQUIPMENT PRIMARY SEDIMENTATION TANKS.

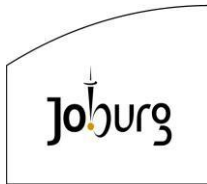
PS 9.6.1 Drawing References

The drawings listed are bound in volume 4 of the tender document.

P&ID Primary sedimentation tanks – Drawing Number 30300141/12-022

PST Concrete layout and details sheet 1 – Drawing Number 30300141/12-111

Employer:		Contractor:	
Witness:		Witness:	



PST Concrete layout and details sheet 2 – Drawing Number 30300141/12-112

PS 9.6.2 Particular Specifications

This specification shall be read in conjunction with the Particular Specification M03 – Rev 5 - Mechanical Primary Sedimentation Tanks.

PS 9.6.3 Scope of Work.

This section covers the design, selection, supply delivery, transport, handling, storage, erection, installation, commissioning, testing, adjustment, handing over in complete working order and upholding during the Defects Liability Period of mechanical equipment as follows:

- a) 2 x peripheral drive circular Primary Sedimentation Tank (PST) scraper mechanisms in accordance with Particular Specification M03. Having a diameter of 35 m and a side water depth of 4.0 m as detailed on the drawings.
- b) 2 x 200 NB knife gate valves for sludge draw-off. Actuated with a modulating electric actuator in accordance with Particular Specification M17.

The following alterations to the Particular specification M03 shall be applicable.

- Clause M03.4.4 - The rotating bridge shall be a three quarter diameter design.
- Clause M03.7.4 - The scum box shall be designed with three sides submerged such that scum is drawn off via these three sides.

PS 9.6.4 Measurement and Payment

Measurement items have been provided under the design, supply and delivery and the install and commission section of the Schedule of Quantities.

The rate tendered for the items shall further include for the labour, material, replacement parts, transport, new fasteners, sand blasting, corrosion protection, testing and commissioning of the Primary Sedimentation Tank Equipment and double handling to ensure compliance with the relevant clauses of the Project and Particular Specifications.

PS 9.7 SECTION 7 – MECHANICAL EQUIPMENT SECONDARY CLARIFIER TANKS.

PS 9.7.1 Drawing References

The drawings listed are bound in volume 4 of the tender document.

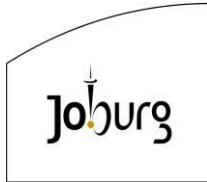
P&ID Reactor 2–..... Drawing Number 30300141/12-026

Clarifier GA concrete details sheet 1 – Drawing Number 30300141/12-401

Clarifier GA concrete details sheet 2 – Drawing Number 30300141/12-413

Clarifier feed pipe longitudinal sections – Drawing Number 30300141/12-434

Employer:		Contractor:	
Witness:		Witness:	



PS 9.7.2 Particular Specifications

This specification shall be read in conjunction with the Particular Specification M10 – Rev 3 - Mechanical Secondary Clarifier Tanks.

PS 9.7.3 Scope of Work.

This section covers the design, selection, supply delivery, transport, handling, storage, erection, installation, commissioning, testing, adjustment, handing over in complete working order and upholding during the Defects Liability Period of mechanical equipment as follows:

- c) 3 x peripheral drive circular Secondary Clarifier Tank (SCT) scraper mechanisms in accordance with Particular Specification M10. Having a diameter of 35m and a side water depth of 4.0m as detailed on the drawings.

The following alterations to the Particular specification M10 shall be applicable.

- Clause M10.7.2 – Scum board shall be constructed in type 304 stainless steel.
- Clause M10.7.5 – Scum box and stricker shall be constructed in type 304 stainless steel.
- Clause M10.8 – Overflow weir shall be constructed in type 304 stainless steel.
- The scum box shall be designed with three sides submerged such that scum is drawn off via these three sides.

Civil Works

The contractor shall be responsible for the screeding and grouting of the installation of all the mechanical equipment and an item has been included in the Bill of Quantities for this work.

PS 9.7.4 Measurement and Payment

Measurement items have been provided under the design, supply and delivery and the install and commission section of the Schedule of Quantities.

The rate tendered for the items shall further include for the labour, material, replacement parts, transport, new fasteners, sand blasting, corrosion protection, testing and commissioning of the Secondary Clarifier Tank equipment and double handling to ensure compliance with the relevant clauses of the Project and Particular Specifications.

Employer:		Contractor:	
Witness:		Witness:	



PS 9.8 SECTION 8 – MECHANICAL EQUIPMENT FOR WASTE SLUDGE THICKENER TANKS.

PS 9.8.1 Drawing References

The drawings listed are bound in volume 4 of the tender document.

P&ID Waste sludge thickeners – Drawing Number 30300141/12-024

WAS thickener GA sheet 1 – Drawing Number 30300141/12-508

WAS thickener GA sheet 2 – Drawing Number 30300141/12-509

PS 9.8.2 Particular Specifications

This specification shall be read in conjunction with the Particular Specification M13 – Rev 4 - Mechanical Sludge Thickener Tanks

PS 9.8.3 Scope of Work.

This section covers the design, selection, supply delivery, transport, handling, storage, erection, installation, commissioning, testing, adjustment, handing over in complete working order and upholding during the Defects Liability Period of mechanical equipment as follows:

- a) 1 x centre drive sludge thickener mechanical mechanisms in accordance with Particular Specification M13. Having a diameter of 28 m and a side water depth of 4.0 m as detailed on the drawings.

PS 9.8.4 Measurement and Payment

Measurement items have been provided under the design, supply and delivery and the install and commission section of the Schedule of Quantities.

The rate tendered for the items shall further include for the labour, material, replacement parts, transport, new fasteners, sand blasting, corrosion protection, testing and commissioning of the Mechanical Sludge Thickener equipment and double handling to ensure compliance with the relevant clauses of the Project and Particular Specifications.

PS 9.9 SECTION 9 – MECHANICAL EQUIPMENT FOR FERMENTATION TANKS.

PS 9.9.1 Drawing References

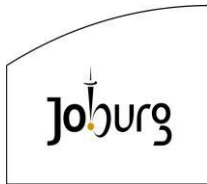
The drawings listed are bound in volume 4 of the tender document.

P&ID Sludge fermentation plant – Drawing Number 30300141/12-023

Fermentation thickener 1 concrete GA – Drawing Number 30300141/12-141

Fermentation Terrace layout – Drawing Number 30300141/12-171

Employer:		Contractor:	
Witness:		Witness:	



PS 9.9.2 Particular Specifications

This specification shall be read in conjunction with the Particular Specification M11 – Rev 4 - Mechanical Fermentation Tanks.

The following alterations to the Particular specification M11 shall be applicable.

- Clause M11.5.3 – Access Bridge Parameters – shall cover the full diameter of the tank.

PS 9.9.3 Scope of Work.

This section covers the design, selection, supply delivery, transport, handling, storage, erection, installation, commissioning, testing, adjustment, handing over in complete working order and upholding during the Defects Liability Period of mechanical equipment as follows:

- a) 1 x centre drive sludge Fermentation Tank mechanical mechanisms in accordance with Particular Specification M11. Having a diameter of 25 m and a side water depth of 5.0 m as detailed on the drawings.

Civil Works

The contractor shall be responsible for the screeding and grouting of the installation of all the mechanical equipment and an item has been included in the Bill of Quantities for this work.

PS 9.9.4 Measurement and Payment

Measurement items have been provided under the design, supply and delivery and the install and commission section of the Schedule of Quantities.

The rate tendered for the items shall further include for the labour, material, replacement parts, transport, new fasteners, sand blasting, corrosion protection, testing and commissioning of the Fermentation Tank equipment and double handling to ensure compliance with the relevant clauses of the Project and Particular Specifications.

PS 9.10 SECTION 10 – MECHANICAL EQUIPMENT FOR FERRIC STORAGE AND DOSING

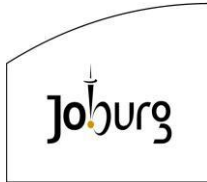
PS 9.10.1 Drawing References

The drawings listed are bound in volume 4 of the tender document.

P&ID Ferric dosing plant –..... Drawing Number 30300141/12-027

Existing Ferric storage and dosing layout – Drawing Number JW13897-CE-211

Employer:		Contractor:	
Witness:		Witness:	



PS 9.10.2 Particular Specifications

This specification shall be read in conjunction with the Particular Specification - M26 - Dosing Pumps and M32 Mechanical Ferric Storage, Handling and Dosing Equipment.

PS 9.10.3 Scope of Work

The Existing ferric chloride dosing system for the existing Reactor 1 comprises:

- 1 x 30 m³ storage tank
- dosing pumps
- piping, fittings, valves including pressure relief valves, pulsation damper, back pressure valves and calibration chamber.
- bunded RC sump with internal corrosion protection.

Under this contract a second 30 m³ storage tank manufactured in GRP, a third pump and related equipment plus delivery pipework will be supplied for installation in the existing Reactor 1 dosing station to provide Ferric Chloride dosing to the proposed Reactor 2 as shown on the P&ID.

Details of the Mechanical Equipment to be supplied are.

- a) Dosing pumps
- | | |
|------------|-----------------------------------|
| Type - | Diaphragm pump with manual stroke |
| Capacity - | 0.15 l/s at 20 m |
| Number - | 1 |
- b) Suction pipe work and fittings from the storage tank to the dosing pumps, including fittings, valves and pipe supports.
- c) Delivery piping from the dosing pumps up to a point 1.0m outside the bund wall including fittings, valves, pressure relief valve, pulsation damper, back pressure valve, calibration chamber and pipe supports.
- d) 1 x 30 m³ storage tank manufactured in GRP complete with access manhole and all necessary inlet and outlet nozzles to suit the connection pipework having diameter and height like the existing storage tank.

Civil Works

The contractor shall be responsible for the screeding and grouting of the installation of all the mechanical equipment and an item has been included in the Bill of Quantities for this work.

PS 9.10.4 Measurement and Payment

Measurement items have been provided under the design, supply and delivery and the install and commission section of the Schedule of Quantities.

The rate tendered for the items shall further include for the labour, material, replacement parts, transport, new fasteners, sand blasting, corrosion protection,

Employer:		Contractor:	
Witness:		Witness:	



testing and commissioning of the Mechanical Equipment for the Ferric Dosing System and double handling to ensure compliance with the relevant clauses of the Project and Particular Specifications.

PS 9.11 SECTION 11 – MECHANICAL EQUIPMENT FOR DISINFECTION STORAGE AND DOSING

PS 9.11.1 Drawing References

The drawings listed are bound in volume 4 of the tender document.

P&ID Disinfection dosing plant – Drawing Number 30300141/12-028

Hydrochlorite system showing Ph 2 tanks –... Drawing Number 30300141/12-073

PS 9.11.2 Particular Specifications

This specification shall be read in conjunction with the Particular Specification - M26 - Dosing Pumps, M27 – Disinfection System Equipment.

PS 9.11.3 Scope of Work

The existing Reactor 1 disinfection plant has been designed for the dosing of liquid Di Basic Filtrate (DBF) a by-product of HTH manufacture as the disinfection chemical to the effluent and consists of the following:

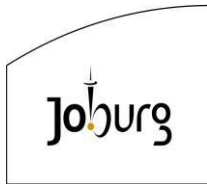
- 2 x DBF storage tanks in concrete bunded area.
- 1 chemical dosing pump.
- Associated piping, instrumentation, and electrical equipment.
- 1x Disinfection contact tank.

Under this contract a third pump and related equipment plus the supply pipeline will be provided in the Reactor 1 installation to provide DBF to the disinfection contact tank 2 as shown on the P&ID.

Details of the Mechanical Equipment to be supplied are.

- 1 x 30 m³ DBF chemical settling tank manufactured in GRP to be installed into the existing plinth once the existing receiving tank has been repositioned – refer item (g) below. It is envisaged that the diameter and support design will be designed to fit onto the existing concrete plinth.
- 1 x 30 m³ DBF chemical storage tank manufactured in GRP having similar dimensions to the existing storage tanks.
- Dosing pumps
 - Type - Peristaltic pump.
 - Capacity - 0.23 l/s at 20 m.
 - Number - 1

Employer:		Contractor:	
Witness:		Witness:	



- d) Pipework from the tanker delivery point to the receiving/settling tank, new storage tank and connection to existing tanks.
- e) Suction pipe work and fittings from the storage tank to the dosing pumps, including fittings, valves and pipe supports.
- f) Delivery piping from the dosing pumps up to a point 1.0 m outside the bund wall including fittings, valves, pressure relief valve, pulsation damper, back pressure valve, calibration chamber and pipe supports.
- g) Repositioning of the existing receiving tank including modifications of pipework as required.

Civil Works

The contractor shall be responsible for the screeding and grouting of the installation of all the mechanical equipment and an item has been included in the Bill of Quantities for this work.

PS 9.11.4 Measurement and Payment

Measurement items have been provided under the design, supply and delivery and the install and commission section of the Schedule of Quantities.

The rate tendered for the items shall further include for the labour, material, replacement parts, transport, new fasteners, sand blasting, corrosion protection, testing and commissioning of the Mechanical Equipment for the Disinfection System and double handling to ensure compliance with the relevant clauses of the Project and Particular Specifications.

PS9.12 SECTION 12 - MECHANICAL EQUIPMENT FOR PUMPING STATIONS

PS9.12.1 Particular Specifications

This specification shall be read in conjunction with the Particular Specification, M18: Mechanical Centrifugal Pumps, M20: Mechanical Valves, M21: Mechanical Pressure Pipework and M33 Elutriation Pumps.

All valve hand wheels must be able to be operated from ground level if this is not possible the contractor must include for access platforms.

PS9.12.2 WAS/scum Pumping Station

Drawing reference

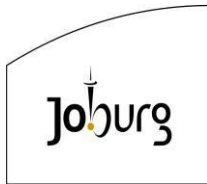
The details pertaining to the WAS/scum pumping equipment to be installed are given on the following drawings included in Volume 4 of the tender document.

P&ID Waste sludge thickeners – Drawing Number 30300141/12-024

Existing WAS and Scum pump station GA – Drawing No 303000141/12-162

Particular Specifications

Employer:		Contractor:	
Witness:		Witness:	



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Volume 2A Scope of Work

This specification shall be read in conjunction with the Particular Specification – M18 – Mechanical Centrifugal Pumps, M20 – Mechanical Valves and M21 – Mechanical Pressure pipework.

Scope of Work

The sludge and scum from the secondary settling tanks are fed into the WAS/Scum sump from where it is pumped by the WAS/Scum pumps via the combined sludge screens to the sludge thickeners.

There are two WAS/scum pumps currently installed operating on a duty/standby basis.

An additional third pump shall be installed under this contract so that the operation would be two pumps duty with one pump standby.

The two existing pumps shall also be replaced with identical units to the additional third pump.

All pumps are to be selected based on a duty of 43 l/sec at 31m per pump.

The pumps shall be capable of handling the solids and other material associated with WAS and Scum from secondary settling tanks.

The tenderer is to include for the suction pipework, valves, delivery pipework, valves, and fittings to accommodate the additional pumps as well as the tying into the existing suction and discharge pipework.

Pipework shall be manufactured from 304 stainless steel, in accordance with the Particular Specification M21: Mechanical Pressure Pipework.

Suction and discharge isolating valves shall be of the RSV gate type.

Sump Drainage Pump

One sump drainage pump capable of delivering 3.0 l/sec against a total head of 10m will be supplied complete with delivery mild steel galvanized pipework, valves, fittings, and pipe supports from the sump pump back to the WAS/scum sump.

Civil Works

The contractor shall be responsible for the screeding and grouting of the installation of all the mechanical equipment and an item has been included in the Bill of Quantities for this work.

PS9.12.3 Final Effluent Sample Pump

Drawing reference

Employer:		Contractor:	
Witness:		Witness:	



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Volume 2A Scope of Work

The details pertaining to the final effluent sample pump equipment to be installed are given on the following drawings included in Volume 4 of the tender document.

P&ID Disinfection dosing plant –..... Drawing Number 30300141/12-028

P&ID Online monitoring of effluent –..... Drawing Number 30300141/12-029

Particular Specifications

This specification shall be read in conjunction with the Particular Specification – M18 – Mechanical Centrifugal Pumps, M20 – Mechanical Valves and M21 – Mechanical Pressure pipework.

Scope of Work

The existing final effluent sample pump is to be replaced with a self-priming centrifugal pump.

The pump shall be selected based on a duty of 0.75 l /sec at 10 m.

The pumps shall be capable of handling the solids and other material associated with final effluent discharged from the WTW.

The tenderer is to include suction pipework, valves, delivery pipework, valves, pipe supports and pipe fittings to accommodate the new sample pumps as well as the tie-in into the existing supply pipework.

Pipework shall be manufactured in galvanized mild steel in accordance with the Particular Specification M21: Mechanical Pressure Pipework.

PS9.12.4 Reactor No 2 Sample Pump

Drawing reference

The details pertaining to the Reactor No 2 Sample pumping equipment to be installed are given on the following drawings included in Volume 4 of the tender document.

P&ID Reactor 2–..... Drawing Number 30300141/12-026

P&ID Online monitoring of effluent –..... Drawing Number 30300141/12-029

Particular Specifications

This specification shall be read in conjunction with the Particular Specification – M18 – Mechanical Centrifugal Pumps, M20 – Mechanical Valves and M21 – Mechanical Pressure pipework.

Scope of Work

Employer:		Contractor:	
Witness:		Witness:	



The centrifugal self-priming pump shall be selected based on a duty of 0.75 l /sec at 20 m.

The pumps shall be capable of handling the solids and other material associated with overflow effluent discharged from Secondary clarifiers.

The tenderer is to include suction pipework, valves, delivery pipework, valves, pipe supports and fittings to accommodate the new sample pumps as well as the tying into the existing supply pipework.

Pipework shall be manufactured in galvanized mild steel in accordance with the Particular Specification M21: Mechanical Pressure Pipework.

PS9.12.5 Reactor No 1 Sample Pump

Drawing reference

The details pertaining to the Reactor No 1 Sample pumping equipment to be installed are given on the following drawings included in Volume 4 of the tender document.

P&ID Online monitoring of effluent –..... Drawing Number 30300141/12-029

Particular Specifications

This specification shall be read in conjunction with the Particular Specification – M18 – Mechanical Centrifugal Pumps, M20 – Mechanical Valves and M21 – Mechanical Pressure pipework.

Scope of Work

The existing Reactor No 1 sample pump is to be replaced with a self-priming centrifugal pump.

The pump shall be selected based on a duty of 0.75 l /sec at 20 m.

The pumps shall be capable of handling the solids and other material associated with overflow effluent discharged from the Secondary Clarifiers.

The tenderer is to include for the suction pipework, valves, delivery pipework, valves, pipe supports and fittings to accommodate the new sample pumps as well as the tie-in into the existing supply pipework.

Pipework shall be manufactured in galvanized mild steel in accordance with the Particular Specification M21: Mechanical Pressure Pipework.

PS9.12.6 Existing VFA Sludge Pump Station

The existing VFA pump station consists of.

- One sludge recirculation pump.

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Witness:		Witness:	



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Volume 2A Scope of Work

- One Sludge wasting pump.
- One sludge pump as common standby to the sludge recirculation and wasting pump.
- Two Elutriant pumps.
- One sump drainage pump.

It is proposed that the pumping configuration be changed to provide for the following;

- Two new sludge transfer pumps (one duty + one standby).
- Two new sludge recirculation pumps (one duty + one standby).
- Three new elutriant pumps (two duty + one standby).
- One new sump drainage pump.

Drawing reference

The details pertaining to the Existing FVA Sludge Pump Station and the proposed new equipment to be installed are given in the following drawings included in Volume 3 of the tender document.

P&ID Sludge fermentation plant –..... Drawing Number 30300141/12-023

GA of Alterations to the VFA - P. S. Drawing Number 30300141/12-161T

Particular Specifications

This specification shall be read in conjunction with the Particular Specification – M18 – Mechanical Centrifugal Pumps, M20 – Mechanical Valves, M21 – Mechanical Pressure pipework and M33 - Elutriation Pumps.

Scope of Work

a) VFA Sludge transfer Pumps

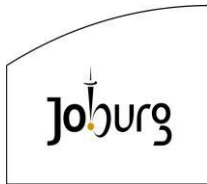
Two VFA sludge transfer pumps (one duty/one standby) shall be supplied; each pump is to be selected to deliver 20 l/sec against a total head of 10.0 m and shall furthermore be able to operate within the system head curve.

The pumps shall be capable of handling the solids and other materials associated with sludge from the fermentation tanks and shall be in accordance with the Particular Specification M12 – Mechanical Elutriation Pumps.

Particular attention must be made to the material of construction as the pH of the VFA sludge can vary from 5.5 to 6.5.

The tenderer shall include for removing the old pipe work, valves, and pumps and for the supply of new suction pipework, valves, delivery pipework, valves as indicated on the drawings as well as the necessary supports to suit the pumps offered up to a point 500mm outside the pump station.

Employer:		Contractor:	
Witness:		Witness:	



All pipework shall be manufactured from 304 stainless steel unless otherwise specified.

The suction and discharge isolating valves shall be of the knife gate type and shall be fitted with limit switches for indication of an open or closed position on the SCADA system.

Provision shall be made to either scour the sludge lines with air or water via purge connections should blockages occur. The tenderer is to make provision for the necessary valves and fittings to accommodate scouring of the sludge lines in their tender pricing.

b) Sump Drainage Pump

One sump drainage pump capable of delivering 4.0 l /sec against a total head of 5m will be supplied complete with delivery mild steel galvanized pipework, valves, fittings, and pipe supports from the sump pump back to the Waste VFA Sludge Pump Sump.

c) Recycle Fermented Sludge Pumps

Fermented sludge is recycled from the Fermented Sludge Sump by the fermented sludge pumps back to the Fermenter Division Box, mixed with fresh primary sludge and further fermented.

Two fermented sludge pumps (one duty/one standby) shall be supplied - each pump is to be selected to deliver 60 l/sec against a total head of 10.0m and shall furthermore be able to operate within the system head curve.

The pumps shall be capable of handling the solids and other materials associated with sludge from the fermentation tanks and shall be in accordance with the Particular Specification M12 – Mechanical Elutriation Pumps.

Particular attention must be made to the material of construction as the pH of the VFA sludge can vary from 5.5 to 6.5.

The tenderer shall include for removing the old pipe work, valves, and pumps and for the supply of new suction pipework, valves, delivery pipework, valves as indicated on the drawings as well as the necessary supports to suit the pumps offered up to a point 500 mm outside the pump station.

All pipework shall be manufactured from 304 stainless steel unless otherwise specified.

The suction and discharge isolating valves shall be of the knife gate type.

Provision shall be made to either scour the sludge lines with air or water via purge connections should blockages occur. The tenderer is to make provision

Employer:		Contractor:	
Witness:		Witness:	



for the necessary valves and fittings to accommodate scouring of the sludge lines in their tender pricing.

d) Elutriant Pumps

The VFA enriched supernatant is discharged from the Sludge Fermenter Thickeners to the Elutriant Sump from where it will be pumped by the elutriant pumps into the Balancing Tank.

Three Elutriant Pumps (two duty + one standby) shall be supplied. Each pump is to be selected to deliver 105l l/sec against a total head of 13.0 m and shall furthermore be able to operate within the system head curve.

The pumps shall be capable of handling the solids and other materials associated with elutriate from the fermentation tanks and shall be in accordance with the Particular Specification M12 – Mechanical Elutriation Pumps.

Particular attention must be made to the material of construction as the pH of the elutriant can vary from 5.5 to 6.5.

The tenderer shall include for the supply of suction pipework, valves, delivery pipework, valves as indicated on the drawings as well as the necessary supports to suit the pumps offered up to a point 500 mm outside the pump station.

All pipework shall be manufactured from 304 stainless steel unless otherwise specified.

The suction and discharge isolating valves shall be of the knife gate type.

Civil Works

The contractor shall be responsible for the screeding and grouting of the installation of all the mechanical equipment and an item has been included in the Bill of Quantities for this work.

PS9.12.7 New VFA Sludge Pump Station

The new VFA Pump Station will be fitted with the following mechanical equipment;

- Two new sludge transfer pumps (one duty + one standby) marked pump No 6 and 7 on drawing 30300141-12-160T.
- Two new sludge recirculation pumps (one duty + one standby) marked pump No 4 and 5 on drawing 30300141-12-160T.
- Three new sludge wasting pumps (two duty + one standby) marked pump No 1, 2 and 3 on drawing 30300141-12-160T.
- One new sump drainage pump.

Employer:		Contractor:	
Witness:		Witness:	



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Volume 2A Scope of Work

- Associated suction and discharge pipework, fittings, valves and supports.

Drawing reference

The details pertaining to the Existing FVA Sludge Pump Station and the proposed new equipment to be installed are given in the following drawings included in Volume 3 of the tender document.

P&ID Sludge fermentation plant –..... Drawing Number 30300141/12-023

GA of the new VFA Pump Station – Drawing Number 30300141/12-160T

Particular Specifications

This specification shall be read in conjunction with the Particular Specification – M18 – Mechanical Centrifugal Pumps, M20 – Mechanical Valves, M21 – Mechanical Pressure pipework and M33 – Elutriation Pumps.

Scope of Work

a) VFA Sludge transfer Pumps

Two VFA sludge transfer pumps (one duty/one standby) shall be supplied; each pump is to be selected to deliver 20 l/sec against a total head of 10.0 m and shall furthermore be able to operate within the system head curve.

The pumps shall be capable of handling the solids and other materials associated with sludge from the fermentation tanks and shall be in accordance with the Particular Specification M12 – Mechanical Elutriation Pumps.

Particular attention must be made to the material of construction as the pH of the VFA sludge can vary from 5.5 to 6.5.

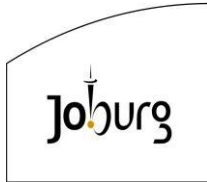
The tenderer shall include for removing the old pipe work, valves, and pumps and for the supply of new suction pipework, valves, delivery pipework, valves as indicated on the drawings as well as the necessary supports to suit the pumps offered up to a point 500 mm outside the pump station.

All pipework shall be manufactured from 304 stainless steel unless otherwise specified.

The suction and discharge isolating valves shall be of the knife gate type and shall be fitted with limit switches for indication of an open or closed position on the SCADA system.

Provision shall be made to either scour the sludge lines with air or water via purge connections should blockages occur. The tenderer is to make provision

Employer:		Contractor:	
Witness:		Witness:	



for the necessary valves and fittings to accommodate scouring of the sludge lines in their tender pricing.

b) Sump Drainage Pump

One sump drainage pump capable of delivering 4.0 l/sec against a total head of 5.0m will be supplied complete with delivery mild steel galvanized pipework, valves, fittings, and pipe supports from the pump back to the thickened sludge sump.

c) Recycle Fermented Sludge Pumps

Fermented sludge is recycled from the Fermented Sludge Sump by the fermented sludge pumps back to the Fermenter Division Box, mixed with fresh primary sludge and further fermented.

Two fermented sludge pumps (one duty/one standby) shall be supplied; each pump is to be selected to deliver 60 l/sec against a total head of 10.0 m and shall furthermore be able to operate within the system head curve.

The pumps shall be capable of handling the solids and other materials associated with sludge from the fermentation tanks and shall be in accordance with the Particular Specification M12 – Mechanical Elutriation Pumps.

Particular attention must be made to the material of construction as the pH of the VFA sludge can vary from 5.5 to 6.5.

The tenderer shall include for removing the old pipe work, valves and pumps and for the supply of new suction pipework, valves, delivery pipework, valves as indicated on the drawings as well as the necessary supports to suit the pumps offered up to a point 500 mm outside the pump station.

All pipework shall be manufactured from 304 stainless steel unless otherwise specified.

The suction and discharge isolating valves shall be of the knife gate type.

Provision shall be made to either scour the sludge lines with air or water via purge connections should blockages occur. The tenderer is to make provision for the necessary valves and fittings to accommodate scouring of the sludge lines in their tender pricing.

Employer:		Contractor:	
Witness:		Witness:	



d) Thickened Sludge Digester Feed Pumps

The thickened fermented sludge from the sludge thickeners will be transferred into the thickened sludge sump from where it will be pumped by the thickened sludge digester feed pumps.

Three thickened sludge digester feed pumps (two duty + one standby) shall be supplied; each pump is to be selected to deliver 20 l /sec against a total head of 14.0 m and shall furthermore be able to operate within the system head curve.

The pumps shall be capable of handling the solids and other materials associated with sludge from the fermentation tanks and shall be in accordance with the Particular Specification M12 – Mechanical Elutriation Pumps.

Particular attention must be made to the material of construction as the pH of the VFA sludge can vary from 5.5 to 6.5.

The tenderer shall include for the supply of suction pipework, valves, delivery pipework, valves and fittings as indicated on the drawings as well as the necessary supports to suit the pumps offered up to a point 500 mm outside the pump station.

All pipework shall be manufactured from 304 stainless steel unless otherwise specified.

The suction and discharge isolating valves shall be of the knife gate type.

Civil Works

The contractor shall be responsible for the screeding and grouting of the installation of all the mechanical equipment and an item has been included in the Bill of Quantities for this work.

PS9.12.8 Measurement and Payment

Measurement items have been provided under the design, supply and delivery and the install and commission section of the Schedule of Quantities.

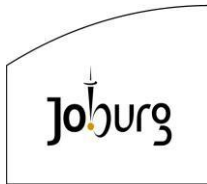
The rate tendered for the items shall further include for the labour, material, replacement parts, transport, new fasteners, sand blasting, corrosion protection, testing and commissioning of the Pumping Equipment as specified in this including double handling to ensure compliance with the relevant clauses of the Project and Particular Specifications.

PS 9.13 SECTION 13 – MECHANICAL EQUIPMENT FOR ODOUR CONTROL

PS 9.13.1 Drawing References

The drawings listed are bound in volume 4 of the tender document.

Employer:		Contractor:	
Witness:		Witness:	



PF Diagram of the Odour Control system – 038	Drawing Number 30300141/12-
Fermentation thickener 1 concrete GA –.....	Drawing Number 30300141/12-141
Fermentation mixing tank -	Drawing Number 30300141/12-154
Extension to existing elutriation pump station -	Drawing Number 30300141/12-157
Fermentation Terrace layout –.....	Drawing Number 30300141/12-171

PS 9.13.2 Particular Specifications

This specification shall be read in conjunction with the Particular Specification – M18 – Centrifugal Pumps, M20 – Mechanical Valves and M21 – Mechanical Pressure Pipework.

PS 9.13.3 Scope of Work

The existing odour control system is not operating and consists of the following:

- 1 x Biocube biofiltration modular system.
- 1 x extraction fan.
- GRP covers for the transfer channels.
- GRP covers for the mixing tank.
- Steel support with fibre covers for the fermentation thickeners.
- HDPE Fume extraction ducting from the extraction points to the odour treatment plant.
- Associated piping, instrumentation, and electrical equipment

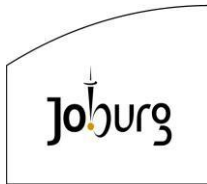
With the extension to the fermentation system, it is required to replace the existing odour control system. The Tenderer must provide for the dismantling of the existing equipment listed above and transporting of the equipment to an onsite storage facility.

Design Extraction Volumes for the new system.

The estimated extraction volume for the various process units is given in the following table.

Summary of extraction volumes		
Mixing tanks	m ³ /hr	249.75
Fermenters (No 1 and 2)	m ³ /hr	991.24
PS Wet well	m ³ /hr	720.00
Transfer channels	m ³ /hr	108.00

Employer:		Contractor:	
Witness:		Witness:	



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Volume 2A Scope of Work

Total Extraction Volume	m ³ /hr	2 068.99

Reference should be made to the P&ID for a more detailed breakdown of the flows from each process unit.

The design capacity of the existing Biocube biofiltration system is 1 250 m³/hr as such will be replaced with a new system under this contract.

The existing covers over the mixing tank and sludge transfer channels are to be removed and stored on site as indicated by the Engineer / JW site management.

Details of the Mechanical Equipment to be supplied under this contract are.

- a) New odour treatment system as specified below.
- b) The tenderer shall include for the design, manufactured, installation and commissioning the of GRP covers for the following units.
 - The existing mixing tank.
 - Existing sludge transfer channels.
 - The new mixing tank.
 - Three new wet well sumps.
 - Covers to the overflow launder of the fermenter thickeners (1 existing and 1 new). The launder cover over the outlet pipe in the launder shall be either removable or hinged to facilitate inspection of the outlet pipe. The final design shall be submitted for approval by the Engineer prior to manufacture. It is envisaged that there would be six extraction connections to each fermenter thickener and the tenderer shall make provision for these connections.

The covers are to be manufactured from GRP and any supports shall be manufactured from GRP, concrete anchors shall be 316 stainless steel.

The final design of the treatment plant and covers shall be submitted for approval by the Engineer prior to manufacture.

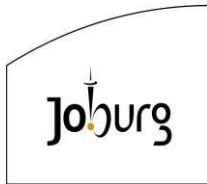
Details of the odour treatment plant

Biological treatment of foul air is the preferred technology for Johannesburg Water Treatment Works and preference is for the use of an engineered mineral based media such as or a structured synthetic/plastic media.

The media must be guaranteed to last for a period of at least 10 years. The tenderer must include a clear guarantee with his bid.

The following design criteria apply to the biofilter systems preferred by Johannesburg Water.

Employer:		Contractor:	
Witness:		Witness:	



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Volume 2A Scope of Work

Parameters	Biofiltration	Trickling Biofiltration
Air contact time (empty bed) in seconds	20 - 40	10 - 20
Air flow rate (m ³ air/m ² biofilter area per hour)	200 - 400	400 - 800
Recirculation hydraulic loading rate (m ³ water/m ² per hour)	n/a	1 - 4

The design criteria presented above are for guidance purposes only and the tenderer is to select actual values to suit the equipment offered and should take into consideration the following factors that can influence the process:

- Ambient Temperature.
- H₂S and TRS loading rates; and
- Type of media.
- Foul air temperatures of + 2°C to +35°C; and
- Foul air relative humidity of 100%.

The design performance criteria for the foul air treatment system are as follows:

- 99 % H₂S and TRS removal under average (median) loading and operating conditions; and
- 95 % H₂S and TRS removal under peak loading and operating conditions, corresponding to minimum temperature conditions.

If the measured H₂S concentration into the plant is less than or equal to 20 parts per million by mass (ppm), then the concentration of H₂S out of the plant shall be less than or equal to 0.2 ppm.

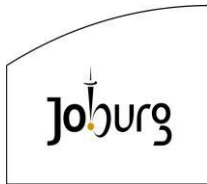
If the measured H₂S concentration into the plant is more than 20 ppm, then the concentration of H₂S out of the plant shall be equal to a reduction of at least 99%.

The odour treatment plant shall also remove the secondary odours of organic sulphides, di-sulphides, and volatile fatty acids. The concentration of these gasses after treatment shall be within the following limits:

Methyl mercaptan	<	1 ppb (parts per billion by mass)
Dimethyle sulphide	<	0.1 ppb
Butyraldehyde	<	5 ppb

Materials of construction

Employer:		Contractor:	
Witness:		Witness:	



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Volume 2A Scope of Work

The foul air collection and treatment systems, infrastructure and equipment are subjected to extreme corrosive conditions. All materials of construction must be resistant to corrosion and suitable for long term exposure to sunlight.

The recommended materials of construction are as follows:

- Covers and domes over channels and tanks from structural GRP designed to allow personnel and equipment access.
- Air ducting from GRP, PVC, PP or HDPE.
- Biofilter structure from GPR designed to accommodate pH of 2.
- Biofilter media from an engineered inert mineral based material, polypropylene or other proprietary media.
- All metal components and fittings to be 316-stainless steel.

Process Control

The process control approach to biofilters and trickling biofilters is simple and based on monitoring of key process variables. The following process variables must be monitored.

Variables	Biofiltration	Trickling Biofiltration
Foul air flow rate	√	√
Irrigation water flow rate	n/a	√
Make-up water flow rate	n/a	√
Blow-down rate	n/a	√
Biofilter flushing rate and duration	√	n/a
Feed foul air temperature	√	√
Exhaust clean air temperature	√	√
Biotrickler/Biofilter bed differential pressure	√	√
Leachate/blowdown water pH	√	√

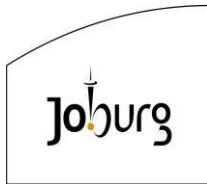
It is not proposed to install on-line H₂S monitors, but to rather implement a routine H₂S monitoring program using handheld H₂S analyser which is to be supplied under this contract.

Experience of Contractor

The Tenderer shall have and demonstrate adequate prior experience in the successful completion of odour treatment projects and shall submit documentation with his tender to demonstrate experience in this regard.

Proven Technology

Employer:		Contractor:	
Witness:		Witness:	



The Tenderer shall demonstrate that the offered odour treatment technology has a track record of successful application in similar installations. Documentation must be submitted with the tender giving contact numbers for references from parties currently using such equipment.

Performance Testing

Performance and mechanical acceptance tests shall be carried out on the equipment for a 28-day period to ensure that the equipment complies with the specification.

The performance tests shall be carried out at the end of this period to allow a bio-accumulation period for the dual stage system to reach full treatment efficiency prior to testing. These tests will be carried out to certify that the plant, as installed on site, is operating in accordance with the required and guaranteed performance of the equipment as specified and must be witnessed by the Engineer. A copy of the written report shall be submitted by the Contractor to the Engineer.

The testing procedure shall be as follows:

- Two Odialog Continuous Gas Loggers (www.odalog.com) shall be supplied by the Contractor for testing the H₂S removal efficiency of the plant.
- The inlet H₂S concentrations shall be monitored with an Odialog Gas Logger calibrated to record concentrations from 1 ppm to 200 ppm.
- The outlet H₂S concentrations shall be monitored with an Odialog Low Range Gas Logger calibrated to record concentrations from 0 to 2 ppm.
- Testing shall be done over three consecutive 1-hour periods under worst-case conditions.

The Contractor shall submit the downloaded data files to the Engineer within 7 days of testing.

Civil Works

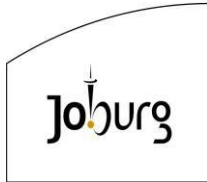
The contractor shall be responsible for the screeding and grouting of the installation of all the mechanical equipment and an item has been included in the Bill of Quantities for this work.

PS9.13.4 Measurement and Payment

Measurement items have been provided under the design, supply and delivery and the install and commission section of the Schedule of Quantities.

The rate tendered for the items shall further include for the labour, material, replacement parts, transport, new fasteners, sand blasting, corrosion protection, testing and commissioning of the Odour Control Equipment as specified in this including double handling to ensure compliance with the relevant clauses of the Project and Particular Specifications.

Employer:		Contractor:	
Witness:		Witness:	



PS 9.14 SECTION 14 – MECHANICAL EQUIPMENT FOR EXISTING HEAD OF WORKS (HOW) NORTH AND SOUTH

PS 9.14.1 Drawing References

The drawings listed are bound in volume 4 of the tender document.

Existing HOW (South) Structure – Drawing Number S/3/5/15.

Existing HOW (North) Structure – Drawing Number XXXXX

PS 9.14.2 Particular Specifications

This specification shall be read in conjunction with the Particular Specification – M01 – Mechanical Screens, M08 – Mechanical Gearboxes and E02 – Electrical Motors.

The following alterations and clarifications to the Particular specification M01 shall be applicable.

- Clause M01.7.1 – Design and Performance Requirements - 8 – “C” Profile for the overhead track is an acceptable alternative to an I-beam.
- Clause M01.7.2 – Table 7-1 Material of construction for the drum in Polyamid is an acceptable alternative to 304 stainless steel.
- Clause M01.7.2 – Table 7-1 Material of construction for the monorail and support columns in hot dipped galvanised steel is an acceptable alternative to 304 stainless steel
- Clause M01.8.1 – 1 - Screenfield bars – shall be manufactured from 40mm wide with a taper from 8mm to 4mm.
- Clause M01.8.1 – 4 - Individual bars – for ease of repair / replacement bars shall be bolted into position.

The trash rake and bar screen manufacturer shall be able to demonstrate adequate experience in manufacturing screens.

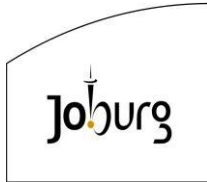
The Tenderer must submit a schedule of equipment installation sites and contact details by the manufacturer.

The design and assembling methods employed during manufacturing of the screen shall be such that refurbishment can be performed timeously, without the necessity of replacing the major structural components of the unit.

The manufacturer shall have a regional office based in the Johannesburg area to be able provide timeously operational support, and maintenance of the equipment as and when required.

The screening equipment shall be fully capable of being maintained by a local company that can demonstrate extensive experience in manufacturing and maintaining of screening equipment.

Employer:		Contractor:	
Witness:		Witness:	



Spare parts shall be manufactured in South Africa by the original equipment manufacturer.

PS 9.14.3 Existing HOW - Scope of Work

General

The existing 25mm bar screens and screenings handling equipment are to be replaced and new trash screens are to be installed upfront of the 25mm bar screens. The details of the replacement screens, screening handling equipment and trash screens are specified below.

1) Existing HOW (North)

a) Trash Screens.

Particular Specifications.

This specification shall be read in conjunction with the Particular Specification M01 - Mechanical Screens.

General requirements.

The incoming wastewater flow from the main sewer to the Unit 3 (North) inlet works splits into two channels then into four parallel screening channels.

Two trash screens will be installed in the two channels upstream of the four-way split to the primary bar screens.

The installation shall comprise of two bar type trash screens and one overhead rake cleaning mechanisms to service both trash screens.

The cleaning mechanism will clean the two trash screens and deposit the screenings into a skip positioned adjacent to the trash rake screening channels on the south side of the HOW.

Performance Requirements.

Each trash rake bar screen shall be front cleaned by one trash rake cleaning mechanism with stationary teeth/bars designed to penetrate the static bar field while descending from the overhead monorail mounted operating mechanism.

A wire rope operated gripper assembly shall close over the collected debris for transportation back to surface and monorailed to the designated discharge area into the screening skip.

Equipment shall be capable of installation in the existing channels and operation under the existing hydraulic conditions.

The equipment shall follow all local codes and statutory regulations as required.

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Trash Rack screens shall be designed in accordance with the following design parameters and configuration requirements indicated on the drawings:

TRASH RAKE H.O.W. NORTH		
Description Unit	Unit	Value
Number of Monorail Traveling Gripper Screens:	No	2
Number of bar racks:	No	2
Peak Flow per bar rack:	m ³ /sec	2.52
Channel Width:	mm	1 600
Channel Depth:	mm	2 250
Screen gap width:	mm	100
Screen bar rack inclination:	degrees	80
Upstream Liquid Level at Peak Flow:	mm	1 975
Head loss At Peak Flow (Clean screen)	mm	45
Head loss at Peak flow (10 % Blinding)	mm	120
Discharge Height (from top of channel):	mm	2 700

Materials of Construction.

Refer to the Particular Specification M01 - Mechanical Screens for details of the material of construction.

Equipment Design Features.

Refer to the Particular Specification M01 - Mechanical Screens for details of the equipment.

Control Panel

The trash rake is to be supplied complete with a locally mounted control panel for the proper operation of the trash rake. Cabling between the control panel and cleaning mechanism shall also be provided.

The screening operation will be initiated either by a timer and a differential level sensor to be supplied with the control panel.

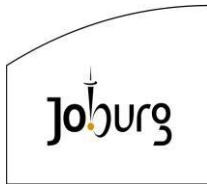
Incoming power supply to the local control panel will be supplied under the electrical scope of works at the appropriate rate.

a) Primary Bar Screens

Particular Specifications.

This specification shall be read in conjunction with the Particular Specification M01 - Mechanical Screens.

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Witness:		Witness:	



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The incoming wastewater flow from the main sewer to the Unit 3 (North) inlet works is split between four parallel screening channels and screened by four front raked primary bar screens.

The primary screens will be protected from stones and large objects by the new trash rakes up front of the primary bar screens.

The equipment shall follow all local codes and statutory regulations as required.

Primary bar screens shall be designed in accordance with the Particular Specification M01 - Mechanical Screens and the following design parameters and configuration requirements indicated on the drawings:

PRIMARY SCREENS H.O.W. NORTH		
Description Unit	Unit	Value
Number of bar screens	No	4
Peak design Flow per bar screen:	m ³ /sec	1.2
Channel Width:	mm	1 600
Channel Depth:	mm	2 250
Screen gap width:	mm	12
Screen bar rack inclination:	degrees	80
Upstream Liquid Level at Peak Flow:	mm	1 975
Head loss At Peak Flow (Clean screen)	mm	27
Head loss at Peak flow (30 % Blinding)	mm	74
Discharge Height (from top of channel):	mm	2 700
Minimum capture efficiency	%age	36

2) Existing HOW (South)

a) Trash Rake.

General requirements.

The incoming wastewater flow from the main sewer to the Unit 5 (South) inlet works splits into three screening channels.

Three bar type trash screens will be installed in the three channels prior to the primary bar screens.

The installation shall comprise of three bar type trash screens and one overhead rake cleaning mechanisms. The cleaning mechanism will clean the three trash

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Witness:		Witness:	



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screens and deposit the screenings into a skip positioned adjacent to the trash rake screening channels on the South side of the HOW.

Performance Requirements.

Each trash rake bar screen shall be front cleaned by one trash rake cleaning mechanism with stationary teeth/bars designed to penetrate the static bar field while descending from the overhead monorail mounted operating mechanism.

A wire rope operated gripper assembly shall close over the collected debris for transportation back to surface and monorailed to the designated discharge area into the screening skip.

Equipment shall be capable of installation in the existing channels and operation under the existing hydraulic conditions.

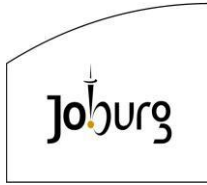
The equipment shall follow all local codes and statutory regulations as required.

Trash Rack screens shall be designed in accordance with the following design parameters and configuration requirements indicated on the drawings:

TRASH RAKE H.O.W. SOUTH		
Description Unit	Unit	Value
Number of Monorail Traveling Gripper Screens:	No	2
Number of bar racks:	No	3
Peak Flow per bar rack:	m ³ /sec	1.3
Channel Width:	mm	2 400
Channel Depth:	mm	2 350
Screen gap width:	mm	100
Screen bar rack inclination:	degrees	80
Upstream Liquid Level at Peak Flow:	mm	1 975
Head loss At Peak Flow (Clean screen)	mm	45
Head loss at Peak flow (10 % Blinding)	mm	120
Discharge Height (from top of channel):	mm	2 700

Materials of Construction.

Employer:		Contractor:	
Witness:		Witness:	



Refer to the Particular Specification M01 - Mechanical Screens for details of the material of construction.

Equipment Design Features.

Refer to the Particular Specification M01 - Mechanical Screens for details of the equipment.

Control panel

The trash rake is to be supplied complete with a locally mounted control panel for the proper operation of the trash rake. Cabling between the control panel and cleaning mechanism shall also be provided.

The screening operation will be initiated either by a timer and a differential level sensor to be supplied with the control panel.

Incoming power supply to the local control panel will be supplied under the electrical scope of works at the appropriate rate.

b) Primary Screen.

Particular Specifications.

This specification shall be read in conjunction with the Particular Specification M01 - Mechanical Screens.

The incoming wastewater flow from the main sewer to the Unit 5 (South) inlet works will be split between three parallel screening channels and screened by three front raked primary bar screens.

The primary screens will be protected from stones and large objects by trash rakes up front of the primary bar screens.

The equipment shall follow all local codes and statutory regulations as required.

Primary bar screens shall be designed in accordance with the Particular Specification and the following design parameters and configuration requirements indicated on the drawings:

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PRIMARY SCREENS HOW SOUTH		
Description Unit	Unit	Value
Number of bar screens	No	3
Peak design Flow per bar screen:	m ³ /sec	1.3
Channel Width:	mm	2 400
Channel Depth:	mm	2 350
Screen gap width:	mm	12
Screen bar rack inclination:	degrees	80
Upstream Liquid Level at Peak Flow:	mm	1 975
Head loss At Peak Flow (Clean screen)	mm	26
Head loss at Peak flow (30 % Blinding)	mm	73
Discharge Height (from top of channel):	mm	2 700
Minimum capture efficiency	%age	36

c) Screenings washer/compactor

This specification shall be read in conjunction with the Particular Specification M01 - Mechanical Screens.

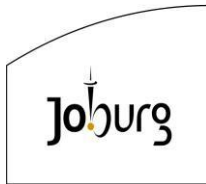
The existing hydro conveyor will be maintained, and a new wash-compactor will be supplied to replace the existing one.

Screenings will be washed of organic material in the washer section then further washed and pressed in the washer/compactor section to remove excess water and reduce screenings volume before being deposited into a skip for off-site disposal.

The washing section shall make use of the hydro conveyance water as the washing water. The contractor is required to satisfy themselves that the existing wash water flow and pressure is adequate for the wash-compactor being proposed.

The estimated design loading for the washing dewatering compactors is detailed in the following table.

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Witness:		Witness:	



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HOW NORTH and SOUTH PRIMARY SCREENINGS		
Primary screen compactor Max Loading		
screenings	m ³ /hr	4.2
wash water	m ³ /hr	28.80
Total screenings and wash water	m ³ /hr	33.00

Wash water for the screening's hydro conveyer and the screening's washing dewatering compactor will be chlorinated final effluent.

The wash water outlet from the screenings washing dewatering compactor shall be returned to the inlet works down-stream of the screens.

PS 9.14.4 Measurement and Payment

Measurement items have been provided under the design, supply and delivery and the install and commission section of the Schedule of Quantities.

The rate tendered for the items shall further include for the labour, material, replacement parts, transport, new fasteners, sand blasting, corrosion protection, testing and commissioning of the Odour Control Equipment as specified in this including double handling to ensure compliance with the relevant clauses of the Project and Particular Specifications.

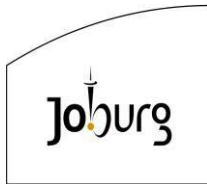
PORTION 3: PARTICULARS OF REQUIRED ELECTRICAL WORK

PSY1.1 Electrical Installation

The Electrical portion of the work shall include but not be limited to the following:

- PSY1.1.1 Unit 5 6.6kV Switching Substation
- PSY1.1.2 Cable Tracing, Identification, Excavation and Reroute
- PSY1.1.3 Unit 5 Standby Power
- PSY1.1.4 Admin Building Standby Power
- PSY1.1.5 Balancing and Primary Settling Tanks
- PSY1.1.6 Elutriation MCC Rooms
- PSY1.1.7 Unit 5 Module 2 (Bioreactor 2)
- PSY1.1.8 Hypochlorite
- PSY1.1.9 Final Effluent
- PSY1.1.10 Waste Sludge Thickeners (WST)
- PSY1.1.11 WAS Pump station

Employer:		Contractor:	
Witness:		Witness:	



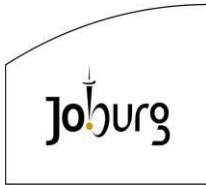
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PSY1.1.12	Unit 5 Area Lighting
PSY1.1.13	Earthing and Lightning protection
PSY1.1.14	Small power and lighting
PSY1.1.15	Cables 97
PSY1.1.16	Cable racks and support steel
PSY1.1.17	Busbar Trunking
PSY1.1.18	Training
PSY1.1.19	Plant and Materials
PSY1.1.20	Data Sheets
PSY1.1.21	Documentation
PSY1.1.22	Shop Drawings
PSY1.1.23	Maintenance Spares
PSY1.1.24	Method Statements
PSY1.2	Quality Assurance
PSY1.1.25	QA Plans

Employer:		Contractor:	
Witness:		Witness:	



PORTION 3: PARTICULARS OF REQUIRED ELECTRICAL WORK

PSY1

This part contains the specific requirements for the project regarding work that is to be carried out at the Johannesburg Waste Water Treatment Works for the electrical, control and instrumentation work that is required for the Unit 5 Module 2 Bioreactor Expansion.

PSY2 SCOPE OF WORK

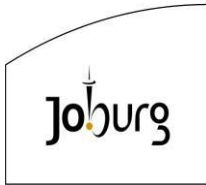
The electrical work to be carried out at the New Unit 5 Module 2 Bioreactor Expansion comprises in general, the following:

- Installation of Medium Voltage cable from the Main Intake sub to the Unit 5 Main intake substation
- Tracing and rerouting of existing Medium Voltage cables at the HOW
- Supply and installation of Medium Voltage switchgear for the Bioreactor.
- Supply and installation of Transformers for the Bioreactor.
- Supply and installation of a Generators for standby power for the Bioreactor and Admin buildings.
- New MCC and DB's to be manufactured and installed per plant specific needs.
- Several MCC cubicles to be retrofitted into existing.
- Low voltage Power and control cables to all new drives.
- Cable racking to support cables where necessary.
- Cable trenching where necessary.
- Small Power and Lighting installation to be done in the new MCC building.
- Area lighting installation.
- Earthing and lightning protection
- Commissioning of the works.

In general, the following shall also form part of the scope of work:

- Liaising with the nominated automation subcontractor regarding the electrical/automation interface requirements.
- Liaising with the Works Manager and/or Electrical Manager during the project,
- Involvement in the testing and commissioning of the complete electrical and automation installation.

Employer:		Contractor:	
Witness:		Witness:	



PSY3 Electrical Installation

The Electrical portion of the work shall include but not be limited to the following:

PSY3.1 Unit 5 6.6kV Switching Substation

The Main Intake Substation (Bulk Supply) supply to Unit 5 Switching substation will be upgraded to accommodate the power requirements of Unit 5 Module 2. Currently, the Unit 5 6.6kV Switching Substation is fed via 2 x 150mm² XLPE cables at each incomer from the Main Intake Substation. As part of the upgrade, an additional 150mm² XLPE cable with external earth wire (KWENA) will be installed for each incomer thus making it 3 x 150mm² XLPE cables for Incomer 1 and 3 x 150mm² XLPE cables for Incomer 2. See drawing ING0645D-5E2-CR04 RevT0 for the existing cable route from the main intake substation.

KWENA conductor cable is a composite stranded cable made up of tinned copper wires and galvanised steel wires that are braided-interwoven to form the cable. KWENA cables will be used for all external earth wires instead of copper cables to deter the current issue of theft.

All proposed transformers for Module 2 will be dual wound 6.6 kV and 11kV in anticipation of proposed change to supply voltage from Eskom. See drawing ING0645D-5E2-GA03 RevT0 for the arrangement of the Unit 5 Module 2 Substation.

The following forms part of the scope of works:

- Supply, delivery, installation and termination of additional new 150mm², 3C, 6.35/11kV 3C XLPE PVC PVC Copper cable as per SANS 1339 Type A from the Main Intake Substation to the Unit 5 Switching Substation
- Excavation in all soil materials i.e. hard and soft soil for trenches, backfill, compact and dispose of the surplus material rubble and soil material.
- Testing and commissioning of the complete electrical installation

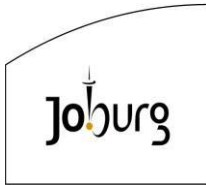
PSY3.2 Cable Tracing, Identification, Excavation and Reroute

Currently, there are seven existing Medium Voltage cables that run near the existing Head of Works plant. These cables require to be re-routed due to construction upgrades on site. It is assumed that the cables are 3C, XLPE copper cables assumedly routed as per drawing ING0645D-5E2-CR04.

The contractor will be responsible for the following:

- Trace the existing cable routes
- Identify and mark each cable accordingly
- Excavate ground where necessary to expose cables
- Supply, deliver and install new cable for each of the 7 off cables according to the new route.
- Supply, deliver and install 2-off joint kits for each cable

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- Excavation of soil materials i.e. hard and soft soil for trenches, backfill, compact and dispose of the surplus material rubble and soil material as per the JW particular Specification E06: Electrical Medium and Low Voltage Cable Installation
- Test and commissioning of complete installation
- The contractor must note that this work is to be carried out on an operational plant and shall cause no disruptions to the operation of the plant. Should there be a need to cut power to a section of the plant, the contractor shall notify the engineer prior to any work being carried out.
- The contractor must also take precautionary measures when excavating as to not damage the existing cables or any other services within the existing or new cable routes.

PSY3.3 Unit 5 Standby Power

Several loads for Unit 5 will require to be fed off Standby power in the event of a municipal power failure. In order to achieve this, a Standby Generator will be placed at the Main Unit 5 Intake Substation. The Generator will supply power at 400VAC and will be stepped up to 6600VAC by means of a step up transformer. The 6.6kV side of the transformer will then tie into the existing Unit 5 Main Intake MV switchgear. The Generator will only be sized for the standby requirements and not the entire connected load on the Unit 5 MV ring. Load shedding will therefore be done by means of Control and Automation (by others).

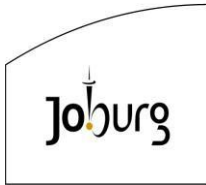
The start-up of the generator shall be done via a controller with dead bus synchronising capability. The generator shall be ramped up slowly on a dead bus in order to magnetize several distribution transformers on the Medium Voltage ring.

The following forms part of the scope of works:

Supply, delivery and installation of a new 1600kVA Prime rated Diesel Generator set with 30% dummy load and control system as per datasheet JW13898-E-010-1 and JW Particular Specification E14: Electrical Supply and Installation of a Standby Generator.

- Supply, delivery and installation of a new 10 000l Bulk storage tank with associated piping and automated fuel transfer panel.
- Supply, delivery and installation of a new 1600kVA dual wound 0.415/66-11kV, YNd 1, step up oil filled distribution transformer.
- Supply, delivery and installation of a new MV switch Incomer breaker to extend the existing switchgear to accept the stepped up standby power.
- Supply, delivery and installation of overhead encapsulated Busbar and trunking system between the Generator and transformer.

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Witness:		Witness:	



- Supply, delivery, installation and termination of new 6.35/11kV 3C XLPE PVC Copper cable as per SANS 1339 Type A from the Step up Transformer to the new extended MV switch.
- Testing and commission of the complete electrical installation

PSY3.4 Admin Building Standby Power

An existing DB in the Main Admin building supplies power to several offices and the plant workshops. It is required that the entire building be supplied by standby power in the event of a mains power failure. It will be the responsibility of the contractor to tie into the existing DB.

The contractor is to pull back the cable feeding the existing Admin DB and re-terminate into the Changeover Panel. The contractor is to then supply and install power and control cable from the Generator to the Changeover panel and from the Changeover panel to the existing DB.

The following forms part of the scope of works:

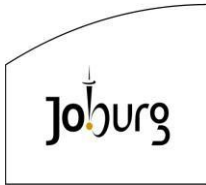
- Supply, delivery and installation of a new 315kVA Prime rated Diesel Generator set with attenuated, weatherproof enclosure as per datasheet JW13898-E-010-2 and according to JW Particular Specification E14: Electrical Supply and Installation of a Standby Generator.
- Supply, delivery and installation of a new 5000l Bulk storage tank with associated piping and automated fuel transfer panel.
- Supply, delivery and installation of a new standalone change over panel to automatically changeover from mains to standby supply.
- Supply, delivery and installation of low voltage cable between the Generator and Change-Over panel.
- Supply, delivery and installation of low voltage cable between the Change-Over panel and the existing Admin building.
- Testing and commission of the complete electrical installation

PSY3.5 Balancing and Primary Settling Tanks

The existing Balancing Tank and PST MCC has sufficient spare capacity to supply the new Balancing Tank and PST equipment. There are currently spare unequipped buckets that will be utilized to supply the relevant equipment. See drawing ING0645D-5E7-GA01 for detail of the existing MCC General Arrangement.

The following forms part of the scope of works:

Employer:		Contractor:	
Witness:		Witness:	



- Supply, delivery and equipping of new motor starters in the existing MCC (combination of unequipped spare buckets and equipped spare buckets).
- Supply, delivery and equipping of an existing instrument DB with valve and instrument feeders.
- Supply, delivery, installation and termination of low voltage cables from the MCC/DB's to the equipment in the field.
- Supply, delivery and installation of local isolator/start/stop push button stations including mounting pedestals.
- Supply, delivery and installation of new cable ladder including supports, fixtures and cable ladder covers to deter against cable theft.
- Testing and commission of the complete electrical installation.

PSY3.6 Elutriation MCC Rooms

Existing Elutriation Pump Station

Several pumps and associated loads for the existing Elutriation pump station will be replaced with bigger pumps. The existing MCC panel has sufficient capacity and spare cubicles to supply these additional loads. The following will form part of the Tender's scope of works:

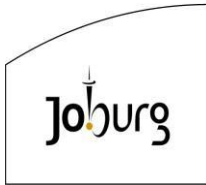
- Rewire the existing spare buckets for the control of the Elutriation Pumps.
- Terminate into the existing motor starters for the Elutriation Pumps.
- Design, supply, delivery and installation (equipping) of existing instrument DB with valve feeder.
- Design, supply, delivery, installation and termination of new cables for the Elutriation pumps.
- Design, supply, delivery and installation of local isolator/start/stop push button stations including mounting pedestals.
- Design, supply, delivery and installation of new cable ladder including supports, fixtures and cable ladder covers to deter against cable theft.
- Test and commission the complete electrical installation.

New Elutriation Pump Station

The new MCC will control and feed power to the new Recirculation pumps, Transfer pumps, Thickener Scraper Drive and the new Odour Control system. The following should form part of the Tender's scope of works for the new Pump station:

- Design, supply, delivery and installation of a new moulded case circuit breaker in the existing Elutriation miniature substation to feed the new Elutriation pump station.

Employer:		Contractor:	
Witness:		Witness:	



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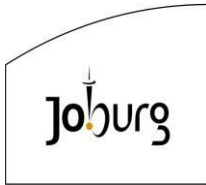
- Design, supply, delivery and installation low voltage cable from the existing Elutriation miniature substation to the new MCC.
- Design, supply, delivery and installation of the new Low Voltage MCC.
- Design, supply, delivery, installation and termination of new cables for the new Elutriation pump station and Odour Control loads.
- Design, supply, delivery and installation of local isolator/start/stop push button stations including mounting pedestals.
- Design, supply, delivery and installation of new cable ladder including supports, fixtures and cable ladder covers to deter against cable theft.
- Design, supply, delivery and installation of a SANS approved Earthing and Lightning protection for the new substation with associated certification of the installation.
- Design, supply, delivery, installation of small power and lighting for the new Elutriation and pump station MCC/PLC room.
- Design, supply, delivery, and installation of high mast area lighting.
- Test and commission the complete electrical installation.

PSY3.7 Unit 5 Module 2 (Bioreactor 2)

A new Bioreactor will be constructed and will be located adjacent to Bioreactor 1. The electrical scope of work for Unit 5 Module 2 Bio-Reactor shall be as follows:

- Rerouting and termination of the existing MV ring cable into the Bioreactor 2 MV switchgear Ring feed.
- Supply, delivery, installation and termination of new 6.35/11kV 3C XLPE PVC Copper cable as per SANS 1339 Type A from the Bioreactor 1 MV switchgear ring feed to the Bioreactor 2 MV switchgear ring feed.
- Supply, delivery and installation of a 6-tier 11kV medium voltage switchgear (two ring isolators and four circuit breakers configuration) to feed the transformers.
- Supply, delivery and installation of four 630kVA dual wound 6.6–11/0.415 kV distribution transformers.
- Supply, delivery, installation and termination of new 6.35/11kV 3C XLPE PVC Copper cable as per SANS 1339 Type A from the MV switchgear to the Transformer primary side.
- Supply, delivery and installation of an approved overhead-encapsulated Busbar trunking system between the transformers (secondary side) and the MCC incomers.
- Supply, delivery and installation of new Low Voltage Motor Control Centre (MCC) with a separate power factor correction panel (complete with auto control and protection).

Employer:		Contractor:	
Witness:		Witness:	



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- Supply, delivery and installation of local isolator/start/stop push button stations including mounting pedestals.
- Supply, delivery and installation of new cable ladder including supports, fixtures and cable ladder covers to deter against cable theft.
- Supply, delivery and installation of a SANS approved Earthing and Lightning protection for the new substation.
- Supply, delivery, installation and termination of all new and existing rerouted cables.
- Supply, delivery and installation of a new Instrumentation DB to supply power to the instruments within the Bioreactor area. (Cabling by others)
- Supply, delivery, installation of small power and lighting equipment and DB for the Bioreactor MCC/PLC building
- Supply, delivery, and installation of high mast area lighting and associated DB's.
- Excavation in all soil materials i.e. hard and soft soil for trenches, backfill, compact and dispose of the surplus material rubble and soil material.
- Testing and commission of the complete electrical installation.

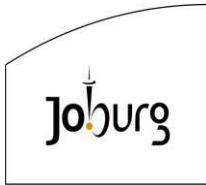
PSY3.8 Hypochlorite

There is an existing MCC for the Hypochlorite area. A new dosing pump will be added to the existing plant. See drawing ING0645D-5E5-GA01 for details.

The scope of works for the Hypochlorite area is as follows:

- Modify the existing 0.37kW VSD spare cubicle to accommodate and supply a 0.75kW VSD drive. (Includes supply, delivery and installation of the VSD and equipment required for modification)
- Design, supply, delivery, installation and termination of new cables.
- Design, supply, delivery and installation of local isolator/start/stop push button station including mounting pedestals.
- Design, supply, delivery and installation of new cable ladder including supports, fixtures and cable ladder covers to deter against cable theft.
- Excavation in all soil materials i.e. hard and soft soil for trenches, backfill, compact and dispose of the surplus material rubble and soil material.
- Testing and commission of the complete electrical installation.

Employer:		Contractor:	
Witness:		Witness:	



PSY3.9 Final Effluent

With the new Unit 5 Phase 2 upgrade, a new disinfection channel will be constructed at the existing Final Effluent Area. The channel will require two additional Penstocks. The contractor is to equip the existing Final Effluent Instrumentation DB to feed the penstocks and to supply and install cable from the Instrument DB to the penstocks in the field.

The detailed scope is as follows:

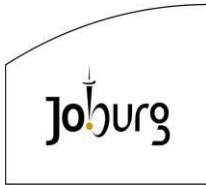
- Equip the existing Final Effluent Instrument DB with 2off 3pole circuit breakers. This includes the supply, delivery and installation of the circuit breakers as well as all mounting brackets, copper tails and terminations to install the circuit breakers.
- Supply, delivery and installation of new cable from the Final effluent substation to the penstocks in the field.
- Supply, delivery and installation of the complete instrument DB with valve feeders.
- Supply, delivery, installation and termination of new cables.
- Supply, delivery and installation of new cable ladder including supports, fixtures and cable ladder covers to deter against cable theft.
- Excavation in all soil materials i.e. hard and soft soil for trenches, backfill, compact and dispose of the surplus material rubble and soil material.
- Testing and commission of the complete electrical installation.

PSY3.10 Waste Sludge Thickeners (WST)

The existing WST MCC has spare space for the new motor starter. The following forms part of the scope of works:

- Supply, delivery and equip complete motor starter in the existing MCC for a Thickener Drive.
- Supply, delivery and equip a MCB in the instrument DB for a valve feeder.
- Supply, delivery, installation and termination of new cables.
- Supply, delivery and installation of local isolator/start/stop push button stations including mounting pedestals.
- Supply, delivery and installation of new cable ladder including supports, fixtures and cable ladder covers to deter against cable theft.
- Excavation in all soil materials i.e. hard and soft soil for trenches, backfill, compact and dispose of the surplus material rubble and soil material.
- Testing and commission of the complete electrical installation.

Employer:		Contractor:	
Witness:		Witness:	



PSY3.11 WAS Pump station

An existing MCC is installed in the WAS pump station. The MCC has an existing spare space available for a motor starter for a WAS pump.

The following forms part of the scope of works:

- Supply, delivery and equipping of the motor starter in the existing MCC.
- Supply, delivery, installation and termination of new cables.
- Supply, delivery and installation of local isolator/start/stop push button stations including mounting pedestals.
- Supply, delivery and installation of new cable ladder including supports, fixtures and cable ladder covers to deter against cable theft.
- Testing and commission of the complete electrical installation.

PSY3.12 Unit 5 Area Lighting

This section covers the supply, delivery and installation of Area lighting around the existing and new Bioreactor to maintain an average lighting level of 20 lux as per SANS 10389.

The scope of works for area lighting is as follows:

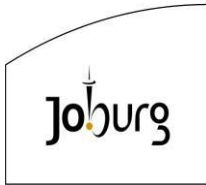
- Supply, delivery and installation of new 20m mid-hinged (scissor-masts) high masts mounted on concrete plinths (by others). Contractor to include rigging of the high masts in situ.
- Supply, delivery and equipping the high masts with eight 400W LED floodlight fittings per mast.
- Supply, delivery, installation of DB's for each high mast as per drawing ING0645D-5E2-SM04. The DB's shall be included in the high mast supply.
- Supply, delivery, installation and termination of new cables to the High mast DBs and floodlights.

PSY3.13 Earthing and Lightning Protection

A new earthing system is required for the new substation installation as well as lightning protection for all new buildings and structures. The earthing and lightning protection design and installation will be done by a specialist subcontractor according to the following design requirements:

- An earthing system consisting of a new earth mat for the Bioreactor 2 substation with a resistance of $<1\Omega$

Employer:		Contractor:	
Witness:		Witness:	



- Lightning protection system with a resistance of $<10\Omega$ for all new buildings where required;

The scope of work for the earthing and lightning protection includes the following:

- The specialist will conduct a full earth resistivity test as well as any other tests required to allow for the design of the earth and lightning protection systems for all new buildings.
- The specialist will design earthing and lightning protection for all new areas. Design drawings must be submitted to the engineer for approval before any procurement of material can be done.
- The specialist/contractor must supply a Bill of Material to the engineer for approval before any procurement of material can be done. The Bill of Material must include all material required to do the installation to the applicable standard.
- The specialist must supply, deliver and install all earthing and lightning protection material required.
- The specialist must test and certify the lightning and earthing system in each area after installation.
- Upon completion, the supplier is to submit as built drawings as well as all the test certificates of the new earthing and lightning system.

PSY3.14 Small Power and Lighting

All small power and lighting shall be installed as per the requirements detailed in general specification E09: Electrical Building Installation.

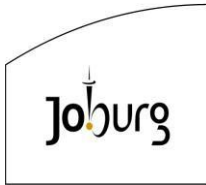
Provisional quantities of small power and lighting materials have been allowed in the bill of quantities, however these quantities are re-measurable and the contractor shall be responsible for measuring up the quantities required on site. The contractor shall only be paid for the quantity of small power and lighting materials installed, as inspected and confirmed by the engineer.

PSY3.15 Cables

Supply, deliver to site, install, terminate, test and commission all MV and LV power cables as required. The MV and LV cable installation, termination, tagging, testing and commissioning shall generally be as per Johannesburg Water's general specification E12: Electrical Medium Voltage Cables, E05: Electrical Low Voltage Power and Control Cables and E06: Electrical Medium and Low Voltage Cable Installation.

The electrical Bill of Quantities indicates the MV and LV power cables required for the installation and provisional lengths have been allowed for each cable run. However these lengths are re-measurable and the contractor shall be responsible for measuring the required length of each cable run on site. The contractor shall only be paid for the quantity of cable installed, as inspected and confirmed by the engineer.

Employer:		Contractor:	
Witness:		Witness:	



PSY3.15.1 MV CABLES

- MV cables shall be XLPE insulated, PVC bedded, steel wire armoured, PVC sheathed 6.35/11kV cables manufactured to SANS 1339 Type A.
- MV cables will be installed in cable trenches that are to be excavated between the main intake substation and the miniature substations.
- MV Cable terminations are to be made on the main intake substation MV switchgear and the miniature substations by means of SANS 1213 compliant adjustable cable glands for SWA cables, complete with shrouds and earthing tags.
- Cable cores shall be connected to the switchgear termination bushings by means of Type C, Euromould separable screened connector, from Iso-Tech systems.

PSY3.15.2 LV CABLES

LV cables shall be:

- Single Core, PVC insulated, PVC sheathed 600/1000V flame retardant (red stripe) cables to SANS 1507-3 and SANS 60332;
- Multi Core, PVC insulated, PVC bedded, steel wire armoured, PVC sheathed 600/1000V flame retardant (red stripe) cables to SANS 1507-3 and SANS 60332;
- Earth cables shall be clear insulated KWENA anti-theft composite cable manufactured according to SANS specification;
- LV cables will be installed in cable ducts, cable trenches and on cable racks. Where LV cables are installed on cable racks, the cables will be fixed to the racks by means of stainless-steel cable ties. The contractor shall take care not to damage the cable sheath when strapping the cables to the racks.
- All armoured LV Cable terminations shall be made by means of SANS 1213 compliant cable glands for SWA cable. Unarmoured cable terminations shall be made by means of SANS 1213 compliant compression cable glands. All LV cable glands shall be Pratley Envirogland Range or approved similar.

PSY3.16 Cable Racks and Support Steel

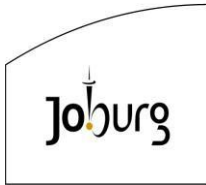
The contractor Supply, deliver to site and install all cable ladders as described below. Cable ladder shall generally be installed as per general specification E02: Electrical Cable Racks.

Tenderers shall allow in their price for all fixing materials (bolts, nuts, spring washers, channel supports, etc.) required to mount the cable ladders on walls or on other steel structures.

All steel cable ladders must be bonded together at every break in their length using a 6 mm² Insulated Copper Earth Wire. This bonding has not been quantified as a separate line item in the bill of quantities and tenderers must therefore allow for this bonding in their price for the cable racks.

Provisional quantities of cable ladder have been allowed in the bill of quantities, however these quantities are re-measurable and the contractor shall be responsible for measuring up the quantities required on site. The contractor shall only be paid for the quantity of cable racks installed, as inspected and confirmed by the engineer.

Employer:		Contractor:	
Witness:		Witness:	



Tenderers shall supply, deliver to site and install cable rack covers for all exposed cable racks outside buildings and cable racks which are not in covered cable ducts that are at risk for theft. The quantities in the Bill of Quantities are re-measurable and the contractor shall be responsible for measuring the quantities required on site. The contractor shall only be paid for the quantity of cable rack covers installed, as inspected and confirmed by the engineer. The cable rack covers will be of the same specification i.e. paint colour and thickness, and material of the cable racks.

PSY3.17 Busbar Trunking

The contractor shall design, supply and deliver busbar trunking as per Johannesburg Water general specification E10: Electrical Busbar Trunking.

The Busbar Trunking shall be installed in the Bioreactor Substation between the four transformers and the MCC.

PSY3.18 Training

The tenderer must allow an amount to cover the cost of training of up to two Johannesburg Water personnel by the supplier (not only the Contractor) on new electrical equipment supplied on this contract. Training will be by the supplier at the supplier's premises or on site. If no training is required, then this amount will not be claimed

PSY3.19 Plant and Materials

All materials intended for the purpose of this Contract shall have the approval of the relevant SANS specifications. Any deviations there from shall be recorded and reported by the Contractor.

PSY3.20 Data Sheets

All the data sheets required for equipment as per the T2.2 Returnable documentation must be completed and submitted with the tender (returnable documents). Incomplete or missing data sheets will result in the disqualification of a tenderer.

PSY3.21 Documentation

User manuals

For all equipment supplied by the Contractor must be included in the O&M manual.

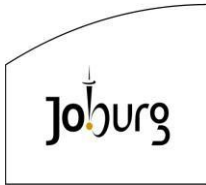
All calibration settings, Trip unit range settings, etc. plus calibration certificates must be included in the documentation.

Three copies of all documentation must be provided.

PSY3.22 Shop Drawings

Before any MCC panel manufacturing or field isolator box manufacturing can start, the successful tenderer must submit detailed panel layout drawings for approval by the Engineer.

Employer:		Contractor:	
Witness:		Witness:	



PSY3.23 Maintenance Spares

A provisional sum has been allowed for in the Bill of Quantities for commissioning spares. The Contractor must supply a list of commissioning spares before completion of the project. A cession to Johannesburg Water for this equipment must be approved before the Contractor can claim for the cost of the commissioning spares.

PSY3.24 Method Statements

Where the Contractor is required to do work in an existing MCC or Distribution panel, a detailed method statement must be approved by the Engineer prior to carrying out the work.

PSY3.25 Quality Assurance

PSY3.25.1 QA Plans

The contractor must submit a quality assurance plan before manufacturing for approval by the engineer. The contractor shall maintain an ISO9001:2008 compliant Quality Assurance / Quality Control system, which shall be used to record the results of all tests and inspections of the electrical installation throughout the construction and commissioning phases. This QA / QC system shall as a minimum contain records of the following tests and inspections:

- Scaffolding inspections and certification;
- Cable megger tests prior to installation (i.e. cables still on the drum).
- Cable megger tests after installation and glanding but prior to final termination of lugs.
- Power supply phase rotation tests.
- Main LV distribution board and Sub distribution board's bus bars megger test prior energizing.
- Wiring point to point checks for both power and control cables.
- Earthing continuity tests.
- Certificates of Compliance (As per SANS 10142) for the MV and LV installation.

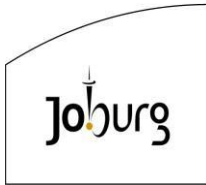
The Contractor shall issue a Quality Assurance plan for approval to the Engineer within 14 days of receiving an order for the work.

The contractor shall also perform all other tests and inspections as required by the general specification for electrical installations attached, and the results thereof shall be recorded in the QA/QC system documentation.

The contractor shall provide all required testing equipment / tools to perform the work and tests listed above. Testing equipment / tools that are to be used shall be at the contractor cost and cannot be claimed for.

The contractor shall commission all electrical equipment installed under this scope of work.

Employer:		Contractor:	
Witness:		Witness:	



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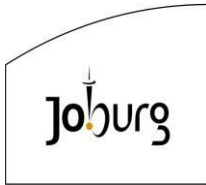


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PSY3.25.2 Factory Acceptance Tests

Part of the QA plan must include factory acceptance tests of the MCC panels, Distribution Boards, SDB and Isolator Stop/Start station at the manufacturer's premises. These panels must undergo a similar test after delivery on site. The test procedures to be followed during these tests must be submitted for the approval of the engineer. The engineer must be notified no less than 5 working days in advance of such planned inspections.

Employer:		Contractor:	
Witness:		Witness:	



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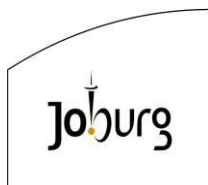


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PARTICULAR SPECIFICATIONS

Volume No.	JW Electrical Design Standards	Rev. No.
E01	Electrical Motors	3
E02	Electrical Cable Racking	4
E03	Electrical Isolator Pushbutton station (Local Start/Stop) Equipment	4
E04	Electrical Low Voltage Distribution Boards and Motor Control Centres	5
E05	Electrical Low Voltage Power & Control Cables	4
E06	Electrical Medium and Low Voltage Cable Installation	4
E07	Electrical Industrial Welding Plugs, Couplers and Socket Outlets	3
E08	Electrical Wiring	3
E09	Electrical Building Installation	3
E10	Electrical Busbar Trunking	3
E11	Electrical Earthing and Lightning Protection	4
E12	Electrical Medium Voltage Cables	3
E13	Electrical Medium Voltage Switchgear	3
E14	Electrical Supply and Installation of A Standby Generator	3
E15	Electrical Transformers	3
E19	Electrical 11kV Ring Main Unit	1
E21	Electrical Lighting and Illumination	1
E23	Electrical Power Factor Correction	1
E26	Electrical Colour Coding of Equipment	1

Employer:		Contractor:	
Witness:		Witness:	



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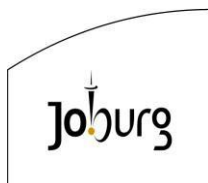


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DATASHEET LOW VOLTAGE DISTRIBUTION BOARDS

Bioreactor (5E2- MCC-01) and Elutriation MCC (5E8-MCC-02) – JW13898-E-002-1

ELECTRICAL PROJECT SPECIFICATION: LOW VOLTAGE SWITCHBOARDS AND MOTOR CONTROL CENTERS				
Reference Number:		JW13898-E-002-1		
PARTICULAR SPECIFICATION				
This Project Specification must be read in conjunction with the Particular Specification E04: Electrical Low Voltage Switchboards and Motor Control Centers. Should any requirement of the Project Specification conflict with any requirement of the Particular Specifications, the requirements of the Project Specifications shall prevail.				
NUMBER OF UNITS AND NAME TAGS				
Item No	Name Tag	Assembly Designation / Description		
	5E2-MCC-01	Unit 5 Module 2 Bioreactor MCC		
	5E8-MCC-02	Elutriation Pump Station 2 MCC		
REFERENCE DRAWINGS				
Item No	Drawing Number	Revision	Title	
	ING0645D-5E2-SM01	T0	Unit 5 Module 2 Bioreactor MCC – 5E2-MCC-001 SLD	
	ING0645D-5E8-SM02	T0	Elutriation MCC 5E8-MCC-02 SLD	
TECHNICAL				
Item No	Description	Unit	Symbol	Specified
	Rated Voltage	Ue	V	400V ±10%
	Rated Frequency		Hz	50
	Rated short-time withstand current	Icw	kA	36
	Network Configuration			3Ph+N, with Protective Earth
	Phase rotation			R-Y-B-R
	Earthing System			TN-S
	Control Voltage		V	230V ±10% (From the Main Busbar Line/Neutral)
	Internal Form of Separation	-	-	3B
	SANS 60439	-	-	TTA (Type Tested Assembly)
	Installation	-	-	Indoor, floor standing, above a cable trench
	Cable Entry	-	-	Bottom only
	Access	-	-	Front access to switchgear
Employer:		Contractor:		
Witness:		Witness:		



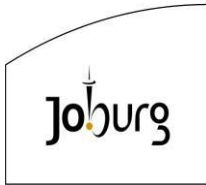
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ELECTRICAL PROJECT SPECIFICATION: LOW VOLTAGE SWITCHBOARDS AND MOTOR CONTROL CENTERS					
Reference Number:		JW13898-E-002-1			
				Front access to cable terminations (wire ways).	
	Busbar Position	-	-	Top	
	Busbar Rating	In	A	2000 minimum	
	Busbar Dropper Rating	In	A	1000 minimum	
	Physical Constraints (Maximum allowable dimension of panel)		mm	5E2-MCC-01 H 2500 W 13000 D 1000	5E8-MCC-02 H 2500 W 5000 D 800
	Transporting sections		mm	2500	
	IP Rating			IP 54	
	Enclosure Material			3CR12 (minimum 2mm thick)	
	Paint Finish			Smooth powder coated	
	Paint Colour , External			Electric Orange, B26	
	Paint Colour , Internal			White	
	Preferred equipment:				
	Circuit Breaker - Incomer			Air Circuit Breaker Withdrawable with busbar shutters Safety interlock for cubicle door handles (with override pin)	
	Circuit Breaker - Bus-Section			N/A	
	Circuit Breaker - Feeder			Moulded Case Circuit Breaker (MCCB) Pad-lockable MCCB rotary handle	
	Circuit Breaker – Motor DOL			Moulded Case Circuit Breaker (MCCB) Pad-lockable MCCB rotary handle	
	Circuit Breaker – VSD/Soft Starter			Moulded Case Circuit Breaker (MCCB) Pad-lockable MCCB rotary handle	
	Protection Type - Incomer			Electronic Overload and overcurrent, Over and Under Voltage, Phase Rotation, Surge Protection Device Type 1&2	
	Protection Type - Feeder			Thermal Magnetic or Electronic Overload	
	Protection Type - Motor			Thermal Overload against short circuit, overcurrent, phase failure, imbalance	
	Earth Leakages			Sensitive earth fault relay.	
	Electricity Meters			Electronic Power Meter on Incomer with Modbus TCP/IP capabilities Analog ammeters on Motor starters	

Employer:		Contractor:	
Witness:		Witness:	



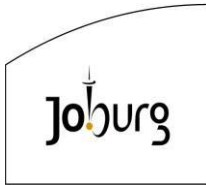
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ELECTRICAL PROJECT SPECIFICATION: LOW VOLTAGE SWITCHBOARDS AND MOTOR CONTROL CENTERS	
Reference Number:	JW13898-E-002-1
	SPECIAL AND ADDITIONAL REQUIREMENTS
	TESTING REQUIREMENTS
	Routine Test (All tests listed below are required)
	Inspection of the assembly including inspection of wiring
	Functional and electrical operation test
	Dielectric test
	Checking of protective measures and of the electrical continuity of the protective circuits
	Insulation resistance
	Type Test (Provide Type Test Certificate of similar panel on the following tests)
	Verification of the temperature rise limits
	Verification of the dielectric properties
	Verification of the short-circuit withstand strength
	Verification of the effectiveness of the protective circuit (earthing and bonding)
	Verification of clearances and creepage distances
	Verification of the mechanical operation
	Verification of the degree of protection (IP rating)
	Site Tests (Tests required during commissioning on site)
	Functional and electrical operation test
	Checking of protective measures and of the electrical continuity of the protective circuits
	Insulation resistance
	DOCUMENTATION REQUIREMENTS
	Required with Bid
	Returnable Schedule JW13898-ERS-002-1 - completed by the vendor
	Preliminary general arrangement drawing (with dimensions)
	Type Test Reports / Certificates (Similar panel) N/A
	Required before Manufacturing commences
	QA / QC Plan in accordance with ISO 9001:2008
	General arrangement drawing (with dimensions)
	Schematics for construction
	Required during FAT
	Recommended Spares List

Employer:		Contractor:	
Witness:		Witness:	



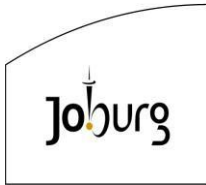
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ELECTRICAL PROJECT SPECIFICATION: LOW VOLTAGE SWITCHBOARDS AND MOTOR CONTROL CENTERS	
Reference Number:	JW13898-E-002-1
	Routine Test Reports / Certificates
	Commissioning Procedure
	As-built General arrangement drawing
	As-built Schematics
	Required upon Delivery
	Site Test Reports / Certificates

Employer:		Contractor:	
Witness:		Witness:	



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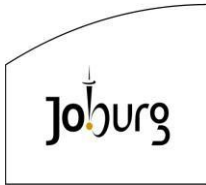


Volume 2A Scope of Work

SMALL POWER AND LIGHTING DB

ELECTRICAL PROJECT SPECIFICATION: DISTRIBUTION BOARD – SMALL POWER and LIGHTING DB				
Reference Number:		JW13898-E-002-2		
	PARTICULAR SPECIFICATION			
This Project Specification must be read in conjunction with the Particular Specification E04: Electrical Low Voltage Switchboards and Motor Control Centers.				
Should any requirement of the Project Specification conflict with any requirement of the Particular Specifications, the requirements of the Project Specifications shall prevail.				
	NUMBER OF UNITS AND NAME TAGS			
Item No	Name Tag	Assembly Designation / Description		
	5E2SDB-001	UNIT 5 MODULE 2 SMALL POWER AND LIGHTING DB		
	5E8SDB-002	ELUTRIATION SMALL POWER AND LIGHTING DB`		
	REFERENCE DRAWINGS			
Item No	Drawing Number	Revision	Title	
	ING0645D-5E2-SM03	T0	Unit 5 Module 2 Bioreactor Substation Small Power and Lighting DB	
	ING0645D-5E8-SM04	T0	Elutriation MCC Room Small Power and Lighting DB	
	TECHNICAL			
Item No	Description	Unit	Symbol	Specified
	Rated Voltage	Ue	V	400V ±10%
	Rated Frequency		Hz	50
	Rated short-time withstand current	Icw	kA	10
	Network Configuration			3Ph+N, with Protective Earth
	Phase rotation			N/A
	Earthing System			TN-S
	Control Voltage		V	N/A
	Internal Form of Separation	-	-	2B for Incomer compartment 1 for Feeder compartment
	SANS 60439	-	-	N/A
	Installation	-	-	Indoor, wall mounted
	Cable Entry	-	-	Top and Bottom
	Access	-	-	Front access to switchgear Front access to cable terminations

Employer:		Contractor:	
Witness:		Witness:	



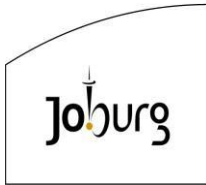
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ELECTRICAL PROJECT SPECIFICATION: DISTRIBUTION BOARD – SMALL POWER and LIGHTING DB				
Reference Number:		JW13898-E-002-2		
	Busbar Position	-	-	As per the manufacturers recommendation
	Busbar Rating	In	A	1000 minimum
	Busbar Dropper Rating	In	A	600 minimum
	Physical Constraints (Maximum allowable dimension of panel)		mm	H 1500 W 1000 D 400
	Transporting sections		mm	N/A
	IP Rating			IP 54
	Enclosure Material			3CR12 (minimum 2mm thick)
	Paint Finish			Smooth powder coated
	Paint Colour , External			Electric Orange, B26
	Paint Colour , Internal			White
	Preferred equipment:			
	Circuit Breaker - Incomer			Moulded Case Circuit Breaker (MCCB) Safety interlock for cubicle door handles (with override pin) Pad-lockable MCCB rotary handle
	Circuit Breaker - Bus-Section			N/A
	Circuit Breaker - Feeder			Miniature Circuit Breaker
	Circuit Breaker – Motor DOL			N/A
	Circuit Breaker – VSD/Soft Starter			N/A
	Protection Type - Incomer			Electronic Overload and overcurrent, Surge Protection Device Type 2
	Protection Type - Feeder			Thermal Magnetic or Electronic Overload
	Protection Type - Motor			Thermal Overload against short circuit, overcurrent, phase failure, imbalance
	Earth Leakages			30mA for plug outlets 300mA for welding plug outlets
	Electricity Meters			N/A
	SPECIAL AND ADDITIONAL REQUIREMENTS			
	TESTING REQUIREMENTS			
	Routine Test (All tests listed below are required)			
	Inspection of the assembly including inspection of wiring			

Employer:		Contractor:	
Witness:		Witness:	



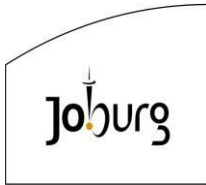
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ELECTRICAL PROJECT SPECIFICATION: DISTRIBUTION BOARD – SMALL POWER and LIGHTING DB	
Reference Number:	JW13898-E-002-2
	Functional and electrical operation test
	Dielectric test
	Checking of protective measures and of the electrical continuity of the protective circuits
	Insulation resistance
	Type Test (N/A)
	Verification of the temperature rise limits
	Verification of the dielectric properties
	Verification of the short-circuit withstand strength
	Verification of the effectiveness of the protective circuit (earthing and bonding)
	Verification of clearances and creepage distances
	Verification of the mechanical operation
	Verification of the degree of protection (IP rating)
	Site Tests (Tests required during commissioning on site)
	Functional and electrical operation test
	Checking of protective measures and of the electrical continuity of the protective circuits
	Insulation resistance
	DOCUMENTATION REQUIREMENTS
	Required with Bid
	Returnable Schedule JW13898-ERS-002-2 - completed by the vendor
	Preliminary general arrangement drawing (with dimensions)
	Type Test Reports / Certificates (Similar panel)
	Required before Manufacturing commences
	QA / QC Plan in accordance with ISO 9001:2008
	General arrangement drawing (with dimensions)
	Schematics for construction
	Required during FAT
	Recommended Spares List
	Routine Test Reports / Certificates
	Commissioning Procedure
	As-built General arrangement drawing
	As-built Schematics
	Required upon Delivery

Employer:		Contractor:	
Witness:		Witness:	



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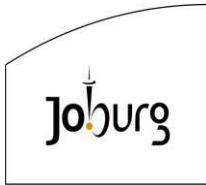
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ELECTRICAL PROJECT SPECIFICATION: DISTRIBUTION BOARD – SMALL POWER and LIGHTING DB	
Reference Number:	JW13898-E-002-2
	Site Test Reports / Certificates

INSTRUMENT DISTRIBUTION BOARD

ELECTRICAL PROJECT SPECIFICATION: DISTRIBUTION BOARD - INSTRUMENT DB				
Reference Number:			JW13898-E-002-3	
	PARTICULAR SPECIFICATION			
This Project Specification must be read in conjunction with the Particular Specification E04: Electrical Low Voltage Switchboards and Motor Control Centers.				
Should any requirement of the Project Specification conflict with any requirement of the Particular Specifications, the requirements of the Project Specifications shall prevail.				
	NUMBER OF UNITS AND NAME TAGS			
Item No	Name Tag	Assembly Designation / Description		
	5E2IDB-001	BIOREACTOR INSTRUMENT DB		
	5E8IDB-002	ELUTRIATION INSTRUMENT DB		
	REFERENCE DRAWINGS			
Item No	Drawing Number	Revision	Title	
	ING0645D-5E2-SM02	T0	Unit 5 Module 2 Bioreactor Instrument DB	
	ING0645D-5E8-SM03	T0	Elutriation Instrumentation DB	
	TECHNICAL			
Item No	Description	Unit	Symbol	Specified
	Rated Voltage	Ue	V	400V ±10%
	Rated Frequency		Hz	50
	Rated short-time withstand current	Icw	kA	10
	Network Configuration			3Ph+N, with Protective Earth
	Phase rotation			N/A
	Earthing System			TN-S
	Control Voltage		V	N/A
	Internal Form of Separation	-	-	1
	SANS 60439	-	-	N/A
	Installation	-	-	Indoor, wall mounted

Employer:		Contractor:	
Witness:		Witness:	



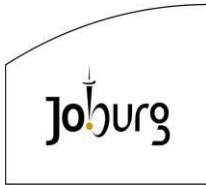
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ELECTRICAL PROJECT SPECIFICATION: DISTRIBUTION BOARD - INSTRUMENT DB				
Reference Number:		JW13898-E-002-3		
	Cable Entry	-	-	Top and Bottom
	Access	-	-	Front access to switchgear Front access to cable terminations
	Busbar Position	-	-	As per Supplier recommendation
	Busbar Rating	In	A	1000 minimum
	Busbar Dropper Rating	In	A	600 minimum
	Physical Constraints (Maximum allowable dimension of panel)		mm	H : 1500 W : 1000 D : 400
	Transporting sections		mm	2500
	IP Rating			IP 54
	Enclosure Material			3CR12 (minimum 2mm thick)
	Paint Finish			Smooth powder coated
	Paint Colour , External			Electric Orange, B26
	Paint Colour , Internal			White
	Preferred equipment:			
	Circuit Breaker - Incomer			Moulded Case Circuit Breaker (MCCB) Safety interlock for cubicle door handles (with override pin) Pad-lockable MCCB rotary handle
	Circuit Breaker - Bus-Section			N/A
	Circuit Breaker - Feeder			Miniature Circuit Breaker
	Circuit Breaker – Motor DOL			N/A
	Circuit Breaker – VSD/Soft Starter			N/A
	Protection Type - Incomer			Electronic Overload and overcurrent, Surge Protection Device Type 2
	Protection Type - Feeder			C-curve
	Protection Type - Motor			N/A
	Earth Leakages			N/A
	Electricity Meters			N/A
SPECIAL AND ADDITIONAL REQUIREMENTS				

Employer:		Contractor:	
Witness:		Witness:	



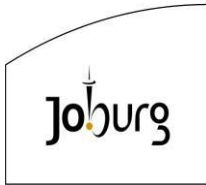
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ELECTRICAL PROJECT SPECIFICATION: DISTRIBUTION BOARD - INSTRUMENT DB	
Reference Number:	JW13898-E-002-3
	TESTING REQUIREMENTS
	Routine Test (All tests listed below are required)
	Inspection of the assembly including inspection of wiring
	Functional and electrical operation test
	Dielectric test
	Checking of protective measures and of the electrical continuity of the protective circuits
	Insulation resistance
	Type Test (N/A)
	Verification of the temperature rise limits
	Verification of the dielectric properties
	Verification of the short-circuit withstand strength
	Verification of the effectiveness of the protective circuit (earthing and bonding)
	Verification of clearances and creepage distances
	Verification of the mechanical operation
	Verification of the degree of protection (IP rating)
	Site Tests (Tests required during commissioning on site)
	Functional and electrical operation test
	Checking of protective measures and of the electrical continuity of the protective circuits
	Insulation resistance
	DOCUMENTATION REQUIREMENTS
	Required with Bid
	Returnable Schedule JW13898-ERS-002-3 - completed by the vendor
	Preliminary general arrangement drawing (with dimensions)
	Type Test Reports / Certificates (Similar panel)
	Required before Manufacturing commences
	QA / QC Plan in accordance with ISO 9001:2008
	General arrangement drawing (with dimensions)
	Schematics for construction
	Required during FAT
	Recommended Spares List
	Routine Test Reports / Certificates

Employer:		Contractor:	
Witness:		Witness:	



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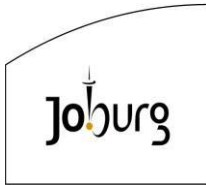


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ELECTRICAL PROJECT SPECIFICATION: DISTRIBUTION BOARD - INSTRUMENT DB	
Reference Number:	JW13898-E-002-3
	Commissioning Procedure
	As-built General arrangement drawing
	As-built Schematics
	Required upon Delivery
	Site Test Reports / Certificates

ADMIN BUILDING CHANGEOVER PANEL

ELECTRICAL PROJECT SPECIFICATION: DISTRIBUTION BOARD – ADMIN BUILDING CHANGEOVER PANEL				
Reference Number:		JW13898-E-002-4		
	PARTICULAR SPECIFICATION			
This Project Specification must be read in conjunction with the Particular Specification E04: Electrical Low Voltage Switchboards and Motor Control Centers.				
Should any requirement of the Project Specification conflict with any requirement of the Particular Specifications, the requirements of the Project Specifications shall prevail.				
	NUMBER OF UNITS AND NAME TAGS			
Item No	Name Tag	Assembly Designation / Description		
	TBC	ADMIN BUILDING CHANGEOVER PANEL		
	REFERENCE DRAWINGS			
Item No	Drawing Number	Revision	Title	
	ING0645-EE-SM02	T0	Unit 5 Module 2 Admin Building Changeover	
	TECHNICAL			
Item No	Description	Unit	Symbol	Specified
	Rated Voltage	Ue	V	400V ±10%
	Rated Frequency		Hz	50
	Rated short-time withstand current	Icw	kA	36
	Network Configuration			3Ph+N, with Protective Earth
	Phase rotation			R-Y-B-R
	Earthing System			TN-S
	Control Voltage		V	230V ±10% (From the Main Busbar Line/Neutral)
Employer:		Contractor:		
Witness:		Witness:		

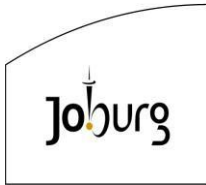


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ELECTRICAL PROJECT SPECIFICATION: DISTRIBUTION BOARD – ADMIN BUILDING CHANGEOVER PANEL				
Reference Number:		JW13898-E-002-4		
	Internal Form of Separation	-	-	2B
	SANS 60439	-	-	N/A
	Installation	-	-	Indoor, floor standing
	Cable Entry	-	-	Top only
	Access	-	-	Front access to switchgear Front access to cable terminations
	Busbar Position	-	-	As per the manufacturers recommendation
	Busbar Rating	In	A	1000 minimum
	Busbar Dropper Rating	In	A	600 minimum
	Physical Constraints (Maximum allowable dimension of panel)		mm	H 2400 W 1200 D 600
	Transporting sections		mm	N/A
	IP Rating			IP 54
	Enclosure Material			3CR12 (minimum 2mm thick)
	Paint Finish			Smooth powder coated
	Paint Colour , External			Electric Orange, B26
	Paint Colour , Internal			White
	Preferred equipment:			
	Circuit Breaker - Incomer			Moulded Case Circuit Breaker (MCCB) Safety interlock for cubicle door handles (with override pin) Pad-lockable MCCB rotary handle Mechanical (Rods / Cable)
	Circuit Breaker - Bus-Section			N/A
	Circuit Breaker - Feeder			Moulded Case Circuit Breaker (MCCB) Safety interlock for cubicle door handles (with override pin) Pad-lockable MCCB rotary handle
	Circuit Breaker – Motor DOL			N/A
	Circuit Breaker – VSD/Soft Starter			N/A
	Protection Type - Incomer			Electronic Overload and overcurrent, Surge Protection Device Type 1&2
	Protection Type - Feeder			Electronic Overload and overcurrent.
	Protection Type - Motor			N/A
	Earth Leakages			N/A
Employer:		Contractor:		
Witness:		Witness:		



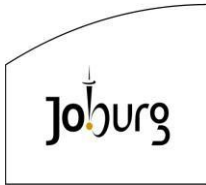
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ELECTRICAL PROJECT SPECIFICATION: DISTRIBUTION BOARD – ADMIN BUILDING CHANGEOVER PANEL				
Reference Number:		JW13898-E-002-4		
	Electricity Meters			N/A
	SPECIAL AND ADDITIONAL REQUIREMENTS			
	TESTING REQUIREMENTS			
	Routine Test (All tests listed below are required)			
	Inspection of the assembly including inspection of wiring			
	Functional and electrical operation test			
	Dielectric test			
	Checking of protective measures and of the electrical continuity of the protective circuits			
	Insulation resistance			
	Type Test (N/A)			
	Verification of the temperature rise limits			
	Verification of the dielectric properties			
	Verification of the short-circuit withstand strength			
	Verification of the effectiveness of the protective circuit (earthing and bonding)			
	Verification of clearances and creepage distances			
	Verification of the mechanical operation			
	Verification of the degree of protection (IP rating)			
	Site Tests (Tests required during commissioning on site)			
	Functional and electrical operation test			
	Checking of protective measures and of the electrical continuity of the protective circuits			
	Insulation resistance			
	DOCUMENTATION REQUIREMENTS			
	Required with Bid			
	Returnable Schedule JW13898-ERS-002-4 - completed by the vendor			
	Preliminary general arrangement drawing (with dimensions)			
	Type Test Reports / Certificates (Similar panel)			
	Required before Manufacturing commences			
	QA / QC Plan in accordance with ISO 9001:2008			
	General arrangement drawing (with dimensions)			
	Schematics for construction			
	Required during FAT			

Employer:		Contractor:	
Witness:		Witness:	



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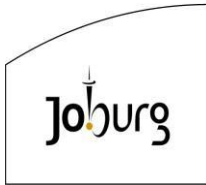
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ELECTRICAL PROJECT SPECIFICATION: DISTRIBUTION BOARD – ADMIN BUILDING CHANGEOVER PANEL	
Reference Number:	JW13898-E-002-4
	Recommended Spares List
	Routine Test Reports / Certificates
	Commissioning Procedure
	As-built General arrangement drawing
	As-built Schematics
	Required upon Delivery
	Site Test Reports / Certificates

Metal Clad Indoor Medium Voltage Switchgear
Unit 5 Module 2 Bioreactor – JW13898-E-007-1
Unit 5 Module Main Intake extension – JW13898-E-007-2

ELECTRICAL PROJECT SPECIFICATION: MEDIUM VOLTAGE SWITCHGEAR				
Reference Number:		JW13898-E-007-2		
	PARTICULAR SPECIFICATION			
This Project Specification must be read in conjunction with the Particular Specification E13: Electrical Medium Voltage Switchgear and the Particular Specification E24: Electrical Battery Tripping Unit.				
Should any requirement of the Project Specification conflict with any requirement of the Particular Specifications, the requirements of the Project Specifications shall prevail.				
	NUMBER OF UNITS AND NAME TAGS			
Item No	Name Tag	Assembly Designation / Description		
	0E1MVS01	Feed from Generator Step Up Transformer		
	REFERENCE DRAWINGS			
Item No	Drawing Number	Revision	Title	
	ING0645D-E-6200	T0	Unit 5 Module 2 Main Single Line Diagram	
	TECHNICAL			
Item No	Description	Symbol	Unit	Incomer
	Quantity			1
	Manufacturer			Actom
	Model			SBV4/800/25/Si
	Busbar Insulation Type			

Employer:		Contractor:	
Witness:		Witness:	



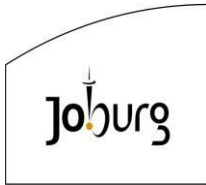
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ELECTRICAL PROJECT SPECIFICATION: MEDIUM VOLTAGE SWITCHGEAR				
Reference Number:		JW13898-E-007-2		
	Switch Insulation Type			Vacuum
	Switchgear Pattern			Fixed
	System Voltage		kV	11
	Insulation Level		kV	13.8
	Basic Impulse Level		kV	95
	Fault Level (for 1 sec.)		kA	25
	Busbar Current Rating		A	800 (Extensible)
	Breaker Current Rating	In	A	800
	Load		kVA	+/-2000
	Local / remote selector switch			Yes
	Trip/Close Switch			Yes
	Buchholz Trip & Alarm Relay			No
	Oil Temperature Trip & Alarm Relay			No
	Aux Trip & Alarm Relay (Pressure)			No
	IDMT O/C & E/F Relay			Self-Powered relay
	Open/Closed Aux Relay			Yes
	Energy Meter			Yes with MODBUS Ethernet capability
	Anti-Pumping Relay			No
	Motor Protection Relay			No
	Trip Circuit Supervision Relay			No
	Master Trip Relay			No
	Ammeter C/W Selector Switch			No
	Voltmeter C/W Selector Switch			No
	Control Circuit Voltage		V	110V DC
	Trip Coil Voltage		V	110V DC
	Close Coil Voltage		V	110V DC
	Spring Charge Motor Mechanism		V	110V DC
	Test Blocks			Yes
	Open/Closed Indication			Yes
	Non-resettable operation counter			Yes
	Anti-condensation Heaters			No

Employer:		Contractor:	
Witness:		Witness:	



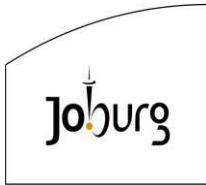
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ELECTRICAL PROJECT SPECIFICATION: MEDIUM VOLTAGE SWITCHGEAR				
Reference Number:		JW13898-E-007-2		
	Trip/Close Pendant			Yes
	Remote Control Panel			No
	Cable Entry			Bottom
	Cable Type			11kV XLPE
	Number of Cable Cores			3C
	Cable Size		mm²	150
	Panel Colour			Grey G12
	Equipment Mounting Chassis Colour			White
	Voltage Transformer			11kV / 110V 3ph Class 0.5 50VA
	Voltage Transformer Mounting			Supplier to determine
	Over Current & Earth Fault CT's			600/300/1A Class 5P20 2.5VA
	Metering CT's			600/300/5A Class 0.5s 7.5VA
	REF protection CT			N/A
	Indication CT's			N/A
	SPECIAL REQUIREMENTS			
	Incomer panel is to be retrofitted to existing SBV4/800/25/Si switchgear on site.			
	BATTERY TRIPPING UNIT			
	Input Voltage		V AC	Not Supplied
	Frequency	f	Hz	Not Supplied
	Maximum Supply Demand		VA	Not Supplied
	Steady State Output Voltage		V DC	Not Supplied
	Steady State Output Current		A	Not Supplied
	TESTING REQUIREMENTS			
	Routine Tests (BTU) Not Supplied			
	Visual inspection and dimensions			
	Checking of wiring and continuity of circuits			
	Ripple content measurement			
	No load test			
	Load test			

Employer:		Contractor:	
Witness:		Witness:	



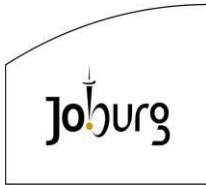
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ELECTRICAL PROJECT SPECIFICATION: MEDIUM VOLTAGE SWITCHGEAR	
Reference Number:	JW13898-E-007-2
	Operational tests for protection, alarm, indication
	Auto/Manual operation test
	Routine Tests (MV SWITCH GEAR)
	Operational tests of all equipment
	One-minute power-frequency voltage test of main and control circuits.
	Accuracy tests for CT's and VT's.
	Type Tests (Type Test certificates to be provided for similar switchgear)
	Mechanical endurance type tests
	Impulse and power frequency voltage tests (SANS 60298)
	Making and breaking capacity of the switching devices (SANS 60298)
	Short time fault current tests (SANS 60298)
	Internal arc. (SANS 60298)
	Site Tests
	Pressure tests on the primary and secondary circuits
	Main circuit resistance ("ductor") tests.
	Primary and secondary injection tests.
	Earth continuity and earth resistance tests.
	Operating tests
	Any other tests that may be required to ascertain the correct functioning of the equipment.
DOCUMENTATION REQUIREMENTS	
	Required with Bid
	Returnable Schedule JW13903-ERS-003 - completed by the vendor
	Preliminary general arrangement drawing (with dimensions)
	Required before Manufacturing commences
	QA / QC Plan in accordance with ISO 9001:2008
	General arrangement drawing (with dimensions)
	Schematics for construction
	Required during FAT
	Recommended Spares List
	Routine Test Reports / Certificates
	Commissioning Procedure
	As-built General arrangement drawing
	As-built Schematics

Employer:		Contractor:	
Witness:		Witness:	



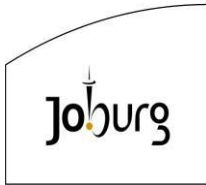
CONTRACT: JW13897
NORTHERN WASTEWATER TREATMENT WORKS
EXPANSION OF CAPACITY UNIT 5 – INSTALLATION OF
MECHANICAL AND ELECTRICAL EQUIPMENT



Volume 2A Scope of Work

ELECTRICAL PROJECT SPECIFICATION: MEDIUM VOLTAGE SWITCHGEAR	
Reference Number:	JW13898-E-007-2
	Required upon Delivery
	Site Test Reports / Certificates

Employer:		Contractor:	
Witness:		Witness:	



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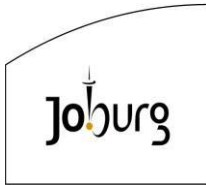


Volume 2A Scope of Work

Standby Generator
Unit 5 Module Main Intake – JW13898-E-010-1
Admin Building – JW13898-E-010-2

ELECTRICAL PROJECT SPECIFICATION: DIESEL GENERATOR				
Reference Number:		JW13898-E-010-1		
PARTICULAR SPECIFICATION				
This Project Specification must be read in conjunction with the Particular Specification E14: Electrical Supply and Installation of a Standby Generator. Should any requirement of the Project Specification conflict with any requirement of the Particular Specifications, the requirements of the Project Specifications shall prevail.				
NUMBER OF UNITS AND NAME TAGS				
Item No	Name Tag	Assembly Designation / Description		
	5E2G01	Unit 5 Main Intake Step-Up Generator		
REFERENCE DRAWINGS				
Item No	Drawing Number	Revision	Title	
	ING0645D-E-6200	T0	Unit 5 Module 2 Main Single Line Diagram	
TECHNICAL				
Item No	Description	Unit	Symbol	Specified
	Output Voltage		V	400
	Rated apparent power (@ 0.8 PF)VA		kVA	1600
	Alternator Output Rating		kVA	1600
	Rated prime power		kW	1280
	Frequency		Hz	50
	Number of phases			3
	Number of wires			4 (3ph +N)
	Duty Type			Prime
	Auxiliary voltage		V	230V 1ph AC
	Switchboard			Yes
	Instrumentation			Yes
	Neutral Earthing Resistor			No
	Dummy load required			No
	Soundproof canopy required			No

Employer:		Contractor:	
Witness:		Witness:	

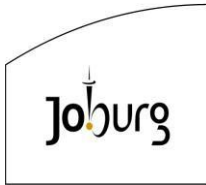


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NORTHERN WASTEWATER TREATMENT WORKS
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Volume 2A Scope of Work

ELECTRICAL PROJECT SPECIFICATION: DIESEL GENERATOR				
Reference Number:		JW13898-E-010-1		
	Container type enclosure required			No
	Additional fuel tank			Yes
	Automatic change-over system			No
	Automatic Start on loss of mains			Yes
	Set to set synchronization required			No
	Set to mains synchronization required			No
	Sound Attenuation			Yes
SPECIAL AND ADDITIONAL REQUIREMENTS				
	The generator is to supply a step up Transformer to feed the MV network. Due to the Transformer Network magnetization, a large inrush current will be present. The Generator will therefore use the dead bus synchronisation technique to slowly ramp up the voltage on the network. An advanced Generator set controller is therefore required. The fuel tank must have a capacity of 10 000-litre Bulk Fuel System aboveground. Supplier to supply, install and commission all pipework with automatic fuel pump control panel. Quarterly Maintenance Contract – 1 Year, 4 visits, with 24/7 Call-out facility. Generator to allow for the following I/O signals: Generator Running Bulk Fuel tank Low level Bulk Fuel tank Low-Low level			
NEUTRAL EARTHING RESISTOR				
	Limit Earth fault to		A	N/A
	Quantity to be supplied			0
TESTING REQUIREMENTS				
	Routine Test (All tests listed below are required)			
	Full load and overheat output with all auxiliary equipment attached			
	Governing for steady and step-loads			
	Fuel consumption			
	All relevant temperatures, pressures, flows, speeds			
	Alternator characteristics including rated full load and overload output, harmonic distortion, regulation under steady and step-loads, voltage transients, recovery times and overshoot			
	Systems operation and fault protection circuits			
	Switchgear and instrumentation			
	Insulation of alternator, cables and switchboard			
	Battery capacity			
Employer:		Contractor:		
Witness:		Witness:		



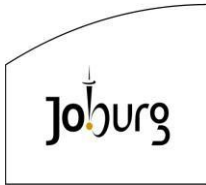
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Volume 2A Scope of Work

ELECTRICAL PROJECT SPECIFICATION: DIESEL GENERATOR	
Reference Number:	JW13898-E-010-1
	All relevant operating temperatures including cooling medium alternator windings, bearings, exhaust gas
	Two test sequences - unity power factor and at 0,85 power factor
	Type Test (Provide Type Test Certificate of similar generator set on the following tests)
	Mechanical endurance type tests
	Engine performance type tests
	Site Tests (Tests required during commissioning on site)
	Insulation and continuity of wiring
	Cold starting and load acceptance
	System operation, fault protection circuits and alarm.
	Switchgear and instrumentation.
	Battery capacity and battery charger
	Six hour test where the diesel alternator shall be subjected to full load for five hours followed by 10% overload for one hour
	Any other tests which may be required to ascertain the correct functioning of the equipment
DOCUMENTATION REQUIREMENTS	
	Required with Bid
	Returnable Schedule JW13898-ERS-010-1 - completed by the vendor
	Preliminary general arrangement drawing (with dimensions)
	Type Test Reports / Certificates (Similar generator)
	Required before Manufacturing commences
	QA / QC Plan in accordance with ISO 9001:2008
	General arrangement drawing (with dimensions)
	Schematics for construction
	Recommended Spares List
	Required during FAT
	Routine Test Reports / Certificates
	Commissioning Procedure
	As-built General arrangement drawing
	As-built Schematics
	Required upon Delivery
	Site Test Reports / Certificates

Employer:		Contractor:	
Witness:		Witness:	



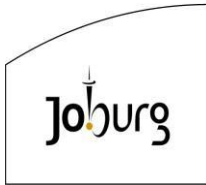
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Volume 2A Scope of Work

Unit 5 Module Main Intake – JW13898-E-010-1

ELECTRICAL PROJECT SPECIFICATION: DIESEL GENERATOR				
Reference Number:		JW13898-E-010-2		
PARTICULAR SPECIFICATION				
This Project Specification must be read in conjunction with the Particular Specification E14: Electrical Supply and Installation of a Standby Generator. Should any requirement of the Project Specification conflict with any requirement of the Particular Specifications, the requirements of the Project Specifications shall prevail.				
NUMBER OF UNITS AND NAME TAGS				
Item No	Name Tag	Assembly Designation / Description		
	GEN ADMIN	Admin Building Standby Generator		
REFERENCE DRAWINGS				
Item No	Drawing Number	Revision	Title	
	ING0645D-EE-SM02	T0	Admin Building Single Line Diagram	
TECHNICAL				
Item No	Description	Unit	Symbol	Specified
	Output Voltage		V	400
	Rated apparent power (@ 0.8 PF)VA		kVA	315
	Alternator Output Rating		kVA	315
	Rated prime power		kW	220
	Frequency		Hz	50
	Number of phases			3
	Number of wires			4 (3ph +N)
	Duty Type			Prime
	Auxiliary voltage		V	230V 1ph AC
	Switchboard			Yes
	Generator Set Controller			Yes
	Instrumentation			Yes
	Neutral Earthing Resistor			No
	Dummy load required			No
	Sound proof canopy required			Yes
	Container type enclosure required			No
Employer:		Contractor:		
Witness:		Witness:		



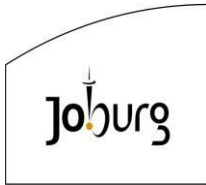
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Volume 2A Scope of Work

ELECTRICAL PROJECT SPECIFICATION: DIESEL GENERATOR				
Reference Number:		JW13898-E-010-2		
	Additional fuel tank			Yes
	Automatic change-over system			Yes
	Automatic Start on loss of mains			Yes
	Set to set synchronization required			No
	Set to mains synchronization required			No
	SPECIAL AND ADDITIONAL REQUIREMENTS			
	Fuel tank to have capacity of 5 000-litre Bulk Fuel System aboveground complete with fuel control panel. The supplier shall supply, install and commission all pipework and fuel control panel. Quarterly Maintenance Contract – 1 Year, 4 visits, with 24/7. Call-out facility			
	NEUTRAL EARTHING RESISTOR			
	Limit Earth fault to		A	N/A
	Quantity to be supplied			0
	TESTING REQUIREMENTS			
	Routine Test (All tests listed below are required)			
	Full load and overheat output with all auxiliary equipment attached			
	Governing for steady and step-loads			
	Fuel consumption			
	All relevant temperatures, pressures, flows, speeds			
	Alternator characteristics including rated full load and overload output, harmonic distortion, regulation under steady and step-loads, voltage transients, recovery times and overshoot			
	Systems operation and fault protection circuits			
	Switchgear and instrumentation			
	Insulation of alternator, cables and switchboard			
	Battery capacity			
	All relevant operating temperatures including cooling medium alternator windings, bearings, exhaust gas			
	Two test sequences - unity power factor and at 0,85 power factor			
	Type Test (Provide Type Test Certificate of similar generator set on the following tests)			
	Mechanical endurance type tests			
	Engine performance type tests			
	Site Tests (Tests required during commissioning on site)			
	Insulation and continuity of wiring			

Employer:		Contractor:	
Witness:		Witness:	



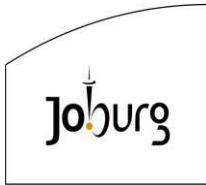
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ELECTRICAL PROJECT SPECIFICATION: DIESEL GENERATOR	
Reference Number:	JW13898-E-010-2
	Cold starting and load acceptance
	System operation, fault protection circuits and alarm.
	Switchgear and instrumentation.
	Battery capacity and battery charger
	Six hour test where the diesel alternator shall be subjected to full load for five hours followed by 10% overload for one hour
	Any other tests which may be required to ascertain the correct functioning of the equipment
DOCUMENTATION REQUIREMENTS	
	Required with Bid
	Returnable Schedule JW13898-ERS-010-2 - completed by the vendor
	Preliminary general arrangement drawing (with dimensions)
	Type Test Reports / Certificates (Similar generator)
	Required before Manufacturing commences
	QA / QC Plan in accordance with ISO 9001:2008
	General arrangement drawing (with dimensions)
	Schematics for construction
	Recommended Spares List
	Required during FAT
	Routine Test Reports / Certificates
	Commissioning Procedure
	As-built General arrangement drawing
	As-built Schematics
	Required upon Delivery
	Site Test Reports / Certificates

Employer:		Contractor:	
Witness:		Witness:	



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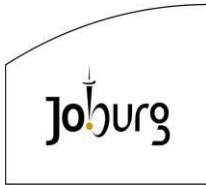
Volume 2A Scope of Work

Transformers

Unit 5 Module 2 Bioreactor Transformer - JW13898-E-013-1

ELECTRICAL PROJECT SPECIFICATION: TRANSFORMERS				
Reference Number:		JW13898-E-013-1		
	PARTICULAR SPECIFICATION			
This Project Specification must be read in conjunction with the Particular Specification E15: Electrical Transformers.				
Should any requirement of the Project Specification conflict with any requirement of the Particular Specifications, the requirements of the Project Specifications shall prevail.				
	NUMBER OF UNITS AND NAME TAGS			
Item No	Name Tag	Assembly Designation / Description		
	5E2T01	Unit 5 Module 2 Transformer 01		
	5E2T02	Unit 5 Module 2 Transformer 02		
	5E2T03	Unit 5 Module 2 Transformer 03		
	5E2T04	Unit 5 Module 2 Transformer 04		
	REFERENCE DRAWINGS			
Item No	Drawing Number	Revision	Title	
	ING0645D-5E2-SM01	T0	Unit 5 Module 2 Bioreactor Single Line Diagram	
	TECHNICAL			
Item No	Description	Specified		
	Rated Power		kVA	630
	Rated Voltage HV		V	11000/6600 (Dual Wound)
	Rated Voltage LV		V	400
	Rated Frequency		Hz	50
	Phases			3
	Winding conductors			Aluminium
	Internal busbars			Aluminium
	Vector Group			Dyn11
	Tank Type			Free breathing with conservator
	Cooling Type			Oil Natural Air Natural (ONAN)
	Earthing			TN-S

Employer:		Contractor:	
Witness:		Witness:	



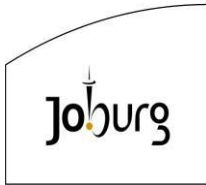
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ELECTRICAL PROJECT SPECIFICATION: TRANSFORMERS				
Reference Number:		JW13898-E-013-1		
	CT's (indicate class)			N/A
	Tap Changer			Off-load with -5%, 2,5% 0%, 2,5% and 5% tap settings
	Tap Changer Position			LV Side
	Colour			RAL7011 – Iron Grey
	Installed			Indoors
	HV Terminal Chamber			Bottom Entry for 150mm² 3-core XLPE, SWA cable
	LV Terminal Chamber			Top Entry for Bus Trunking system.
	SANS 780			Oil Transformer
	Protection Devices			
	Temperature Alarm			Yes
	Temperature Trip			Yes
	Buchholz Alarm			Yes
	Buchholz Trip			Yes
	Pressure Relief Valve			No
	Pressure Relief Alarm			No
	Pressure Relief Trip			No
	SPECIAL AND ADDITIONAL REQUIREMENTS			
	None			
	TESTING REQUIREMENTS			
	Routine Test to be performed on transformers in accordance to SANS 780 (All tests listed below are required)			
	Measurement of winding resistance			
	Insulation resistance measurement			
	Measurement of voltage ratio			
	Impedance test			
	Vector group test			
	Measurement of transformer losses			
	Induced over voltage test			
	Separate source voltage withstand test			
	Tank effective of sealing			
	DOCUMENTATION REQUIREMENTS			
	Required with Bid			

Employer:		Contractor:	
Witness:		Witness:	



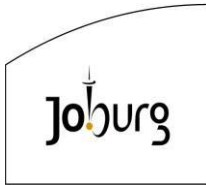
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ELECTRICAL PROJECT SPECIFICATION: TRANSFORMERS	
Reference Number:	JW13898-E-013-1
	Returnable Schedule JW13898-ERS-013-1 - completed by the vendor
	Preliminary general arrangement drawing (with dimensions)
	Required before Manufacturing commences
	QA / QC Plan in accordance with ISO 9001:2008
	General arrangement drawing (with dimensions)
	Schematics for construction
	Required during FAT
	Recommended Spares List
	Routine Test Reports / Certificates
	Commissioning Procedure
	As-built General arrangement drawing
	As-built Schematics
	Required upon Delivery
	Site Test Reports / Certificates

Employer:		Contractor:	
Witness:		Witness:	



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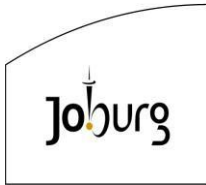


Volume 2A Scope of Work

Unit 5 Main Intake Step Up Transformer- JW13898-E-013-2

ELECTRICAL PROJECT SPECIFICATION: TRANSFORMERS				
Reference Number:		JW13898-E-013-2		
	PARTICULAR SPECIFICATION			
This Project Specification must be read in conjunction with the Particular Specification E15: Electrical Transformers.				
Should any requirement of the Project Specification conflict with any requirement of the Particular Specifications, the requirements of the Project Specifications shall prevail.				
	NUMBER OF UNITS AND NAME TAGS			
Item No	Name Tag	Assembly Designation / Description		
	5EET01	Unit 5 Main Step Up Transformer 01		
	REFERENCE DRAWINGS			
Item No	Drawing Number	Revision	Title	
	ING0645D-E-6200	T0	Unit 5 Main Intake Single Line Diagram	
	TECHNICAL			
Item No	Description	Specified		
	Rated Power		kVA	1600
	Rated Voltage HV		V	11000/6600 (Dual Wound)
	Rated Voltage LV		V	400
	Rated Frequency		Hz	50
	Phases			3
	Winding conductors			Aluminium
	Internal busbars			Aluminium
	Vector Group			Dyn11
	Tank Type			Free breathing with conservator
	Cooling Type			Oil Natural Air Natural (ONAN)
	Earthing			TN-S
	CT's (indicate class)			N/A
	Tap Changer			Off-load with -5%, 2,5% 0%, 2,5% and 5% tap settings
	Tap Changer Position			LV Side
	Colour			RAL7011 – Iron Grey
	Installed			Indoors

Employer:		Contractor:	
Witness:		Witness:	



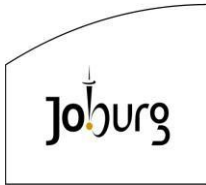
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ELECTRICAL PROJECT SPECIFICATION: TRANSFORMERS				
Reference Number:		JW13898-E-013-2		
	HV Terminal Chamber			Bottom Entry for 150mm² 3-core XLPE, SWA cable
	LV Terminal Chamber			Top Entry for Bus Trunking
	SANS 780			Oil Transformer
	Protection Devices			
	Temperature Alarm			Yes
	Temperature Trip			Yes
	Buchholz Alarm			Yes
	Buchholz Trip			Yes
	Pressure Relief Valve			No
	Pressure Relief Alarm			No
	Pressure Relief Trip			No
	SPECIAL AND ADDITIONAL REQUIREMENTS			
	Manufacturer to supply a 11kV, 20A, 3s Neutral Earthing Resistor.			
	TESTING REQUIREMENTS			
	Routine Test to be performed on transformers in accordance to SANS 780 (All tests listed below are required)			
	Measurement of winding resistance			
	Insulation resistance measurement			
	Measurement of voltage ratio			
	Impedance test			
	Vector group test			
	Measurement of transformer losses			
	Induced over voltage test			
	Separate source voltage withstand test			
	Tank effective of sealing			
	DOCUMENTATION REQUIREMENTS			
	Required with Bid			
	Returnable Schedule JW13898-ERS-013-2 - completed by the vendor			
	Preliminary general arrangement drawing (with dimensions)			
	Required before Manufacturing commences			
	QA / QC Plan in accordance with ISO 9001:2008			
	General arrangement drawing (with dimensions)			

Employer:		Contractor:	
Witness:		Witness:	



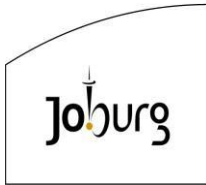
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Volume 2A Scope of Work

ELECTRICAL PROJECT SPECIFICATION: TRANSFORMERS	
Reference Number:	JW13898-E-013-2
	Schematics for construction
	Required during FAT
	Recommended Spares List
	Routine Test Reports / Certificates
	Commissioning Procedure
	As-built General arrangement drawing
	As-built Schematics
	Required upon Delivery
	Site Test Reports / Certificates

Employer:		Contractor:	
Witness:		Witness:	



PORTION 4: PARTICULARS OF REQUIRED CONTROL & INSTRUMENTATION WORK

TECHNICAL SPECIFICATION INSTRUMENTATION INSTALLATION

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Employer:		Contractor:	
Witness:		Witness:	



PSZ 1 SCOPE OF WORK

The scope of supply of the instrumentation part of this contract shall be the manufacturing, supply, delivery, safe storage on site before installation, installation and commissioning of the process control and monitoring instrumentation systems listed in this tender document and on the relevant drawings.

The instrumentation equipment shall include the following:

- The supply, delivery, installation and commissioning of various ultrasonic level meters.
- The supply, delivery, installation and commissioning of various flow meters.
- The supply, delivery, installation and commissioning of various analysers.
- The supply, delivery, installation and commissioning of various instrument control panels (ICPs) for all motorised valves supplied.
- The supply, delivery, installation and commissioning of instrument junction boxes (IJBs) for all instruments supplied.
- The supply, delivery, installation and commissioning of the PLC hardware as specified.
- The supply, delivery, installation and commissioning of various PLC panels as specified.
- The supply, delivery, installation and commissioning of various UPS' as specified.
- The supply, delivery, installation and commissioning of Ethernet network switches.
- The supply, delivery, installation, splicing, termination and testing of data communication fibre-optic cables.

PSZ 2 GENERAL

PLC Numbers can be used to determine which drawings are relevant to that PLC. For Instance, the Unit 5 Bioreactor 2 PLC's number is PLC-80. The relevant drawings for this PLC will start with "JW13898-80-".

All C&I drawings can be found in Volume 4 of this Tender.

Employer:		Contractor:	
Witness:		Witness:	



PSZ 3 PLC HARDWARE AND CABLING

PSZ 3.1 List of PLCs

Below is an overview for the PLCs:

Description	PLC Number	Make	Action
U5 Bioreactor 2 PLC (NW0580BIO02)	PLC-80	Schneider M580	New PLC, network switch, UPS etc,
U5 Final Effluent PLC (NW0505EPS01)	PLC-05	Schneider M580	Replace existing PLC, network switch and UPS etc, Add IO cards for module 2 equipment
U5 Main Intake Substation (NW0507MIS01)	PLC-07	Schneider M580	Replace existing PLC, network switch and UPS etc, Add IO cards for module 2 equipment
U5 Elutriation PLC (NW0508ELT01)	PLC-08	Schneider M580	Replace existing PLC, network switch and UPS etc, Supply new PLC panel, to be a Remote PLC.
U5 PST and Balancing Tank PLC (NW0501PST01)	PLC-01	Schneider M580	Replace existing PLC, network switch and UPS etc, Add IO cards for Module 2 equipment.
U5 WAS Pumpstation PLC (NW0503WPS01)	PLC-03	Schneider Premium	Replace existing PLC, network switch and UPS etc, Add IO card for Module 2 equipment
U5 WST PLC (NW0504WST01)	PLC-04	Schneider M580	Replace existing PLC, network switch and UPS etc, Add IO card for Module 2 equipment
U5 HypoChlorite PLC (NW0506CHL01)	PLC-06	Schneider Premium	Replace existing PLC, network switch and UPS etc, Add IO card for Module 2 equipment
U5 Bioreactor 1 PLC (NW0502BIO01)	PLC-02	Schneider Premium	Replace existing PLC, network switch and UPS etc, Add IO card for Module 2 equipment

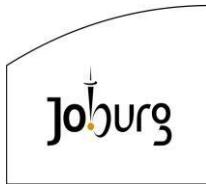
PSZ 3.2 PLC Equipment

All new PLC panels and modifications on existing PLC panels must comply with the following Johannesburg Water automation and control design standards:

- PLC Panels (volume 3)
- Clean power and surge protection (volume 5) (this includes UPS requirements)
- Cabling (volume 6)
- Networking (volume 7)
- Labelling (volume 25)

PSZ 3.2.1 Unit 5 Bioreactor 2 (NW0580BIO02)

Employer:		Contractor:	
Witness:		Witness:	



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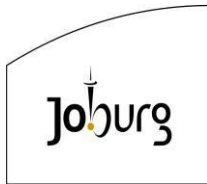
Volume 2A Scope of Work

This PLC shall be complete with a floor-standing, bottom-entry enclosure, 24V DC power supply, circuit breakers, surge protection, Ethernet switch (see PSZ 3.7), UPS, etc. and wired to the relevant I/O. The Contractor shall ensure that there is sufficient space for all terminals, fused terminals, circuit breakers, surge protection, etc. There shall also be sufficient space to ensure that all spare cards can be equipped and wired in future if required (refer to PLC schematic to find what future cards must be allowed for). The PLC panel must be equipped with a true online UPS.

The PLC hardware that must be supplied under this contract for the unit 5 bioreactor 2 PLC is listed in the table below:

Item	Description	Reference	Description	Qty
1	Processors	BMEP582040	M580 processor level 2 for D&R (DISTRIBUTED & REMOTE) I/O	1
2	M580 Power Supplies	BMXCPS3500	HIGH POWER AC POWER SUPPLY	2
3	M580 Racks	BMEXBP0800 BMEXBP1200	8 SLOTS BACKPLANE 12 SLOTS BACKPLANE	1 1
4	M580 Digital Inputs	BMXDDI6402K	DIG 64I 24 VDC SINK	4
5	M580 Digital Outputs	BMXDDO3202K	DIG 32Q TRANS SOURCE 0.1A	2
6	M580 Analogue Modules	BMXAMI0810	ANA 8 U/I IN ISOLATED FAST	4
		BMXAMO0410	ANA 4 U/I OUT ISOLATED	1
7	M580 Accessories	ABE7S16E2M0	BAS REL ST W10 16I 230VAC ISOLATED	14
		ABE-7R16S210	Sub-base with 16 N/O Relay Contacts 5A, 1 x HE10	3
		BMXFCC303	FCN TO 2 HE (1x40-way to 2x10 HE Connectors)3M CONNECTING CABLE	8
		BMXFCC301	FCN TO 1HE (1x40-way to 1x10 HE Connectors)3M CONNECTING CABLE	1
		ABE7CPA02	Sub-base for BMXAMI0810	4
		BMXFTA300	3M CORD ANA 28-WAYAY (Between BMXAMI0810 - 8xA/I Module & ABE7CPA02 Sub-Base)	4
		BMXFTB2010	Screw Terminal 20-way for BMXAMO0410	1
		BMXXBC030K	BACKPLANE EXTENSION CABLE 3M	1
		TSXTLYEX	2 BUS X TERMINATOR	1
		BMXXBE1000	STANDARD BACKPLANE EXTENDER (one in main rack and every extension rack)	2
		BMENOC0321	M580 Ethernet Comm, Module	1
		BMXRMS008MP	MEM CARD 8 MB	1

Employer:		Contractor:	
Witness:		Witness:	



PSZ 3.2.2 U5 Final Effluent PLC (NW0505EPS01)

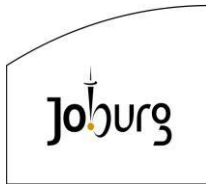
The existing PLC shall be replaced with the M580 PLC and the existing PLC panel shall be refurbished, the network switch, SPDs and UPS shall be replaced with new ones. The new M580 PLC rack must be installed on the same back plate position as the existing PLC. The Contractor shall ensure that there is sufficient space for all terminals, fused terminals, circuit breakers, surge protection, etc. There shall also be sufficient space to ensure that all spare cards can be equipped and wired in future if required (refer to PLC schematic to find what future cards must be allowed for).

Wire the new equipment to the added PLC cards. The existing copper Ethernet cable must be removed and a new CAT6 copper Ethernet cable must be installed from the new M580 CPU to the new ethernet switch.

The PLC hardware that must be supplied under this contract for the unit 5 final effluent PLC is listed in the table below:

Item	Description	Reference	Description	Qty
1	Processors	BMEP582040	M580 processor level 2 for D&R (DISTRIBUTED & REMOTE) IOs	1
2	M580 Power Supplies	BMXCPS3500	HIGH POWER AC POWER SUPPLY	1
3	M580 Racks	BMEXBP1200	12 SLOTS BACKPLANE	1
4	M580 Digital Inputs	BMXDAI1615	DIG 16DI 220 VAC	3
5	M580 Digital Outputs	BMXDRA1605	16 DO Relay card	2
6	M580 Analogue Modules	BMXAMI0810	ANA 8 U/I IN ISOLATED FAST	2
7	M580 Accessories	ABE7CPA02	Sub-base for BMXAMI0810	2
		BMXFTB2010	Screw Terminal 20-way for BMXAMO0410	2
		BMXFTA300	3M CORD ANA 28-WAY (Between BMXAMI0810 - 8xA/I Module & ABE7CPA02 Sub-Base)	2
		BMXRMS004GPF	4GB Memory card for M580 CPU	1
		BMENOC0321	M580 Ethernet Comm. Module	1

Employer:		Contractor:	
Witness:		Witness:	



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Volume 2A Scope of Work

		BMXFTB4000	40-pin removable caged terminal block for BMXDAI1615	2

PSZ 3.2.3 Unit 5 Main Intake Substation (NW0507MIS01)

The existing PLC shall be replaced with the M580 PLC and the existing PLC panel shall be refurbished, the network switch, SPDs and UPS shall be replaced with new ones. The new M580 PLC rack must be installed on the same back plate position as the existing PLC. The Contractor shall ensure that there is sufficient space for all terminals, fused terminals, circuit breakers, surge protection, etc. There shall also be sufficient space to ensure that all spare cards can be equipped and wired in future if required (refer to PLC schematic to find what future cards must be allowed for). The PLC panel must be equipped with a true online UPS.

Wire the new equipment to the added PLC cards. The existing copper Ethernet cable must be removed and a new CAT6 copper Ethernet cable must be installed from the new M580 CPU to the new ethernet switch.

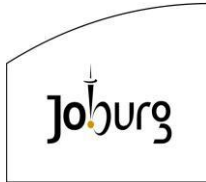
The PLC hardware that must be supplied under this contract for the main intake substation PLC is listed in the table below:

Item	Description	Reference	Description	Qty
1	Processors	BMEP582040	M580 processor level 2 for D&R (DISTRIBUTED & REMOTE) IOs	1
2	M580 Power Supplies	BMXCPS3500	HIGH POWER AC POWER SUPPLY	1
3	M580 Racks	BMEXBP0800	8 SLOTS BACKPLANE	1
4	M580 Digital Inputs	BMXDAI1615	DIG 16DI 220 VAC	3
5	M580 Accessories	BMENOC0321	M580 Ethernet Card for M580 CPU	1
		BMXFTB4000	40-pin removable caged terminal block for BMXDAI1615	3
		BMXRMS004GPF	4GB Memory card for M580 CPU	1

PSZ 3.2.4 Unit 5 Elutriation (NW0508ELT01)

The existing PLC shall be replaced with the M580 PLC and the existing PLC panel shall be refurbished. The network switch, SPDs and UPS shall be replaced with new ones. The new M580 PLC rack must be installed on the same back plate position as the existing PLC. The Contractor shall supply a new PLC panel housing and a new remote PLC rack in the new Elutriation building. This PLC shall be complete with a floor-standing panel, bottom-entry enclosure, 24V DC power supply, circuit breakers, surge protection, etc. and wired to the relevant I/O. The Contractor shall

Employer:		Contractor:	
Witness:		Witness:	



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Volume 2A Scope of Work

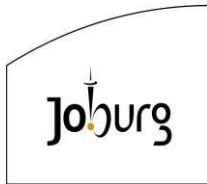
ensure that there is sufficient space for all terminals, fused terminals, circuit breakers, surge protection, etc. There shall also be sufficient space to ensure that all spare slots in the PLC racks can be equipped and wired in future if required. The PLC panels must be equipped with a true online UPS.

Wire the new equipment to the added PLC cards. The existing copper Ethernet cable must be removed and a new CAT6 copper Ethernet cable must be installed from the new M580 CPU to the new ethernet switch.

The PLC hardware to be supplied under this contract for the unit 5 Elutriation PLC is listed in the below table:

Item	Description	Reference	Description	Qty
1	Processors	BMEP582040	M580 processor level 2 for D&R (DISTRIBUTED & REMOTE) IOs	1
2	M580 Power Supplies	BMXCPS3500	HIGH POWER AC POWER SUPPLY	3
3	M580 Racks	BMEXBP1200	12 SLOTS BACKPLANE	3
4	M580 Digital Inputs	BMXDDI6402K	DIG 64I 24 VDC SINK	2
		BMXDAI1615	DIG 16DI 220 VAC	7
5	M580 Digital Outputs	BMXDDO3202K	DIG 32Q TRANS SOURCE 0.1A	1
		BMXDRA1605	16 DO Relay card	3
6	M580 Analogue Modules	BMXAMI0810	ANA 8 U/I IN ISOLATED FAST	5
		BMXAMO0410	ANA 4 U/I OUT ISOLATED	1
		BMXAMO0802	Analog output module X80, 8 output channels	1
7	M580 Accessories	ABE7S16E2M0	BAS REL ST W10 16I 230VAC ISOLATED	8
		ABE-7R16S210	Sub-base with 16 N/O Relay Contacts 5A, 1 x HE10	2
		BMXFCC303	FCN TO 2 HE (1x40-way to 2x10 HE Connectors)3M CONNECTING CABLE	5
		ABE7CPA02	Sub-base for BMXAMI0810	5
		BMXFTA300	3M CORD ANA 28-WAY (Between BMXAMI0810 - 8xA/I Module & ABE7CPA02 Sub-Base)	5
		BMXFTB2010	Screw Terminal 20-way for BMXAMO0410	4
		BMENOC0321	M580 Ethernet Comm. Module	1
		BMXXBC030K	BACKPLANE EXTENSION CABLE 3M	1
		TSXTLYEX	2 BUS X TERMINATOR	1

Employer:		Contractor:	
Witness:		Witness:	



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		BMXXBE1000	STANDARD BACKPLANE EXTENDER (one in main rack and every extension rack)	2
		BMXRMS004GPF	4GB Memory card for M580 CPU	1
		BMECRA31210	X80 RIO Drop E/IP Perf	1
		BMXFCA300	ANALOG 3M CONNECTING CABLE (Between BMXAMO0410 A/O module & ABE7CPA21 sub-base)	1
		BMXFTB4000	40-pin removable caged terminal block for BMXDAI1615	7

PSZ 3.2.5 U5 PST and Balancing Tank PLC (NW0501PST01)

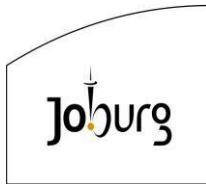
The existing PLC shall be replaced with the M580 PLC and the existing PLC panel shall be refurbished, the network switch, SPDs and UPS shall be replaced with new ones. The new M580 PLC rack must be installed on the same back plate position as the existing PLC. The Tier 8 of the MCC shall be used to house IO terminals and SPD if space runs out in the PLC panel. The Contractor shall ensure that there is sufficient space for all terminals, fused terminals, circuit breakers, surge protection, etc. There shall also be sufficient space to ensure that all spare cards can be equipped and wired in future if required (refer to PLC schematic to find what future cards must be allowed for).

Wire the new equipment to the added PLC cards. The existing copper Ethernet cable must be removed and a new CAT6 copper Ethernet cable must be installed from the new M580 CPU to the new ethernet switch.

The PLC hardware that must be supplied under this contract for the unit 5 PST and Balancing Tank PLC is listed in the table below:

Item	Description	Reference	Description	Qty
1	Processors	BMEP582040	M580 processor level 2 for D&R (DISTRIBUTED & REMOTE) IOs	1
2	M580 Power Supplies	BMXCPS3500	HIGH POWER AC POWER SUPPLY	2
3	M580 Racks	BMEXBP1200	12 SLOTS BACKPLANE	2
4	M580 Digital Inputs	BMXDAI1615	DIG 16DI 220 VAC	9
5	M580 Digital Outputs	BMXDRA1605	16 DO Relay card	3
6	M580 Analogue Modules	BMXAMI0810	ANA 8 U/I IN ISOLATED FAST	3
		BMXAMO0802	Analog output module X80, 8 output channels	1

Employer:		Contractor:	
Witness:		Witness:	



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7	M580 Accessories	BMXFTB4000	40-pin removable caged terminal block for BMXDAI1615	9
		ABE7CPA02	Sub-base for BMXAMI0810	4
		BMXFTA300	3M CORD ANA 28-WAY (Between BMXAMI0810 - 8xA/I Module & ABE7CPA02 Sub-Base)	3
		BMXFCA300	ANALOG 3M CONNECTING CABLE (Between BMXAMO0410 A/O module & ABE7CPA21 sub-base)	1
		BMXFTB2010	Screw Terminal 20-way for BMXAMO0410	3
		BMXXBC030K	BACKPLANE EXTENSION CABLE 3M	1
		TSXTLYEX	2 BUS X TERMINATOR	1
		BMXXBE1000	STANDARD BACKPLANE EXTENDER (one in main rack and every extension rack)	2
		BMXRMS004GPF	4GB Memory card for M580 CPU	1
		BMENOC0321	M580 Ethernet Comm. Module	1

PSZ 3.2.6 U5 WST PLC (NW0504WST01)

The existing PLC shall be replaced with the M580 PLC and the existing PLC panel shall be refurbished, the network switch, SPDs and UPS shall be replaced with new ones. The new M580 PLC rack must be installed on the same back plate position as the existing PLC. The M580 PLC rack must be installed across two of the three empty rows above the existing PLC. One empty trunking must be removed to make space for the new M580 PLC rack. The M580 CPU must have the required free space above the CPU as prescribed by the manufacturer. The circuit breakers and 24V power supply must be installed on the PLC back plate.

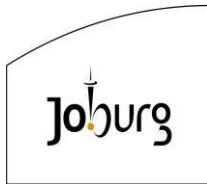
Wire the new equipment to the added PLC cards. The existing copper Ethernet cable must be removed and a new CAT6 copper Ethernet cable must be installed from the new M580 CPU to the new ethernet switch.

Care must be taken not to disturb existing wiring.

The PLC hardware that must be supplied under this contract for the unit 5 WST PLC is listed in the table below:

Item	Description	Reference	Description	Qty

Employer:		Contractor:	
Witness:		Witness:	



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Volume 2A Scope of Work

1	Processors	BMEP582040	M580 processor level 2 for D&R (DISTRIBUTED & REMOTE) IOs	1
2	M580 Power Supplies	BMXCPS3500	HIGH POWER AC POWER SUPPLY	1
3	M580 Racks	BMEXBP1200	12 SLOTS BACKPLANE	1
4	M580 Digital Inputs	BMXDAI1615	DIG 16DI 220 VAC	2
5	M580 Digital Outputs	BMXDRA1605	16 DO Relay card	1
6	M580 Analogue Modules	BMXAMI0810	ANA 8 U/I IN ISOLATED FAST	1
7	M580 Accessories	ABE7CPA02	Sub-base for BMXAMI0810	1
		BMXFTA300	3M CORD ANA 28-WAY (Between BMXAMI0810 - 8xA/I Module & ABE7CPA02 Sub-Base)	1
		BMXFTB2010	Screw Terminal 20-way for BMXAMO0410	1
		BMXFTB4000	40-pin removable caged terminal block for BMXDAI1615	2
		BMXRMS004GPF	4GB Memory card for M580 CPU	1

PSZ 3.2.7 U5 WAS Pump Station PLC (NW0503WPS01)

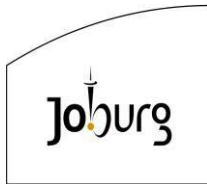
The existing PLC shall be replaced with the M580 PLC and the existing PLC panel shall be refurbished, the network switch, SPDs and UPS shall be replaced with new ones. The new M580 PLC rack must be installed on the same back plate position as the existing PLC. The Contractor shall ensure that there is sufficient space for all terminals, fused terminals, circuit breakers, surge protection, etc. There shall also be sufficient space to ensure that all spare cards can be equipped and wired in future if required (refer to PLC schematic to find what future cards must be allowed for).

Wire the new equipment to the added PLC cards. Care must be taken not to disturb existing wiring. The existing copper Ethernet cable must be removed and a new CAT6 copper Ethernet cable must be installed from the new M580 CPU to the new ethernet switch.

There is sufficient spare space in the PLC to accommodate all new equipment. Refer to P&ID JW13898-04-024 (03-PMP004).

The PLC hardware that must be supplied under this contract for the unit 5 WAS PLC is listed in the table below:

Employer:		Contractor:	
Witness:		Witness:	



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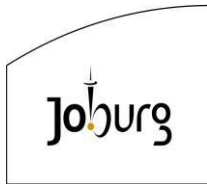
Volume 2A Scope of Work

Item	Description	Reference	Description	Qty
1	Processors	BMEP582040	M580 processor level 2 for D&R (DISTRIBUTE D & REMOTE) IOs	1
2	M580 Power Supplies	BMXCPS3500	HIGH POWER AC POWER SUPPLY	1
3	M580 Racks	BMEXBP1200	12 SLOTS BACKPLANE	1
4	M580 Digital Inputs	BMXDAI1615	DIG 16DI 220 VAC	3
5	M580 Digital Outputs	BMXDRA1605	16 DO Relay card	1
6	M580 Analogue Modules	BMXAMI0810	ANA 8 U/I IN ISOLATED FAST	1
7	M580 Accessories	ABE7CPA02	Sub-base for BMXAMI0810	1
		BMXFTA300	3M CORD ANA 28-WAY (Between BMXAMI0810 - 8xA/I Module & ABE7CPA02 Sub-Base)	1
		BMXFTB2010	Screw Terminal 20-way for BMXAMO0410	1
		BMXFTB4000	40-pin removable caged terminal block for BMXDAI1615	3
		BMXRMS004GPF	4GB Memory card for M580 CPU	1
		BMENOC0321	M580 Ethernet Comm Module	1

PSZ 3.2.8 U5 Hypochlorite PLC (NW0506CHL01)

The existing PLC shall be replaced with the M580 PLC and the existing PLC panel shall be refurbished, the network switch, SPDs and UPS shall be replaced with new ones. The new M580 PLC rack must be installed on the same back plate position as the existing PLC. The Contractor shall ensure that there is sufficient space for all terminals, fused terminals, circuit breakers, surge

Employer:		Contractor:	
Witness:		Witness:	



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protection, etc. There shall also be sufficient space to ensure that all spare cards can be equipped and wired in future if required (refer to PLC schematic to find what future cards must be allowed for).

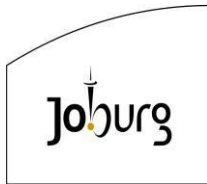
The existing copper Ethernet cable must be removed and a new CAT6 copper Ethernet cable must be installed from the new M580 CPU to the new ethernet switch. Care must be taken not to disturb existing wiring.

Wire the new equipment to the existing PLC cards. There is sufficient spare space in the PLC to accommodate all new equipment. Refer to P&ID JW13898-05-028 (06-PMP003 and 06-LIT003).

The PLC hardware that must be supplied under this contract for the unit 5 Hypochlorite PLC is listed in the table below:

Item	Description	Reference	Description	Qty
1	Processors	BMEP582040	M580 processor level 2 for D&R (DISTRIBUTED & REMOTE) IOS	1
2	M580 Power Supplies	BMXCPS3500	HIGH POWER AC POWER SUPPLY	1
3	M580 Racks	BMEXBP1200	12 SLOTS BACKPLANE	1
5	M580 Digital Inputs	BMXDAI1615	DIG 16DI 220 VAC	2
6	M580 Digital Outputs	BMXDRA1605	16 DO Relay card	1
7	M580 Analogue Modules	BMXAMI0810	ANA 8 U/I IN ISOLATED FAST	2
		BMXAMO0802	Analog output module X80, 8 output channels	1
9	M580 Accessories	ABE7CPA02	Sub-base for BMXAMI0810	2
		BMENOC0321	M580 Ethernet Module	1
		BMXFCA300	ANALOG 3M CONNECTING CABLE (Between BMXAMO0410 A/O module & ABE7CPA21 sub-base)	1
		BMXFTW308S	Preformed cable for BMXAMI0810 3m	1
		BMXFTB2010	Screw Terminal 20-way for BMXAMO0410	1
		BMXFTB4000	40-pin removable caged terminal block for BMXDAI1615	2
		BMXRMS004GPF	4GB Memory card for M580 CPU	1

Employer:		Contractor:	
Witness:		Witness:	



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Volume 2A Scope of Work

		BMXFTA300	3M CORD ANA 28-WAY (Between BMXAMI0810 - 8xA/I Module & ABE7CPA02 Sub-Base)	1

PSZ 3.2.9 U5 Bioreactor 1 PLC (NW0502BIO01)

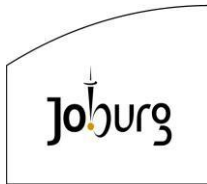
The existing PLC shall be replaced with the M580 PLC and the existing PLC panel shall be refurbished, the network switch, SPDs and UPS shall be replaced with new ones. The new M580 PLC rack must be installed on the same back plate position as the existing PLC. The Contractor shall ensure that there is sufficient space for all terminals, fused terminals, circuit breakers, surge protection, etc. There shall also be sufficient space to ensure that all spare cards can be equipped and wired in future if required (refer to PLC schematic to find what future cards must be allowed for).

Wire the new equipment to the added PLC cards. The existing copper Ethernet cable must be removed and a new CAT6 copper Ethernet cable must be installed from the new M580 CPU to the new ethernet switch.

The PLC hardware that must be supplied under this contract for the unit 5 Bioreactor 1 PLC is listed in the table below:

Item	Description	Reference	Description	Qty
1	Processors	BMEP582040	M580 processor level 2 for D&R (DISTRIBUTE D & REMOTE) IOs	1
2	M580 Power Supplies	BMXCPS3500	HIGH POWER AC POWER SUPPLY	2
3	M580 Racks	BMEXBP1200	12 SLOTS BACKPLANE	2
4	M580 Digital Inputs	BMXDAI1615	DIG 16DI 220 VAC	12
5	M580 Digital Outputs	BMXDRA1605	16 DO Relay card	3
6	M580 Analogue Modules	BMXAMI0810	ANA 8 U/I IN ISOLATED FAST	2
		BMXAMO0802	Analog output module X80, 8 output channels	1

Employer:		Contractor:	
Witness:		Witness:	



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7	M580 Accessories	ABE7S16E2M0	BAS REL ST W10 16I 230VAC ISOLATED	0
		ABE7CPA02	Sub-base for BMXAMI0810	3
		BMXFTA300	3M CORD ANA 28-WAY (Between BMXAMI0810 - 8xA/I Module & ABE7CPA02 Sub-Base)	2
		BMXFCA300	ANALOG 3M CONNECTING CABLE (Between BMXAMO0410 A/O module & ABE7CPA21 sub-base)	1
		BMXFTB2010	Screw Terminal 20-way for BMXAMO0410	3
		BMXFTB4000	40-pin removable caged terminal block for BMXDAI1615	12
		BMXXBC030K	BACKPLANE EXTENSION CABLE 3M	1
		TSXTLYEX	2 BUS X TERMINATOR	1
		BMXXBE1000	STANDARD BACKPLANE EXTENDER (one in main rack and every extension rack)	2
		BMXRMS004GP F	4GB Memory card for M580 CPU	1
		BMENOC0321	M580 Ethernet Module	1

PSZ 3.2.10 Commissioning Spares

Employer:		Contractor:	
Witness:		Witness:	



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Volume 2A Scope of Work

The Contractor must supply the following commissioning spares to replace faulty equipment during commissioning.

Item	Description	Reference	Description	Qty
1	Processors	BMEP582040	M580 processor level 2 for D&R (DISTRIBUTED & REMOTE) I/O	1
2	M580 Power Supplies	BMXCPS3500	HIGH POWER AC POWER SUPPLY	1
3	M580 Racks	BMEXBP1200	12 SLOTS BACKPLANE	1
		BMEXBP0800	8 SLOTS BACKPLANE	1
4	M580 Digital Inputs	BMXDDI6402K	DIG 64I 24 VDC SINK	1
		BMXDAI1615	DIG 16DI 220 VAC	1
5	M580 Digital Outputs	BMXDDO3202K	DIG 32Q TRANS SOURCE 0.1A	1
		BMXDRA1605	16 DO Relay card	1
6	M580 Analogue Modules	BMXAMI0810	ANA 8 U/I IN ISOLATED FAST	1
		BMXAMO0410	ANA 4 U/I OUT ISOLATED	1
7	M580 Communication Modules	BMXNOC0321	M580 Ethernet Comm. Module	1
		BMECRA31210	X80 RIO Drop E/IP Perf	1
8	M580 Accessories	ABE7S16E2M0	BAS REL ST W10 16I 230VAC ISOLATED	1
		ABE-7R16S210	Sub-base with 16 N/O Relay Contacts 5A, 1 x HE10	1
		BMXFCC303	FCN TO 2 HE (1x40-way to 2x10 HE Connectors)3M CONNECTING CABLE	1
		ABE7CPA02	Sub-base for BMXAMI0810	1
		BMXFTA300	3M CORD ANA 28-WAYAY (Between BMXAMI0810 - 8xA/I Module & ABE7CPA02 Sub-Base)	1
		BMXFTB2010	Screw Terminal 20-way for BMXAMO0410	1
		BMXXBC030K	BACKPLANE EXTENSION CABLE 3M	1
		TSXTLYEX	2 BUS X TERMINATOR	1
		BMXXBE1000	STANDARD BACKPLANE EXTENDER (one in main rack and every extension rack)	1
		BMXRMS008MP	MEM CARD 8 MB	1
		BMXFTW305	Connecting cable for the BMXDAI1615 card (3meter)	1
9	Additional Spares	TBC	24V Power Supply	1
			220V Supply SPD	1
			220V I/O SPD	1

Employer:		Contractor:	
Witness:		Witness:	



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Volume 2A Scope of Work

			24V SPD	1
			4-20mA SPD	1
			Area Switch	1
			SFP	1

The “Additional Spares” (item 9 the table above) must have the same part numbers as the equipment supplied for the PLC panels.

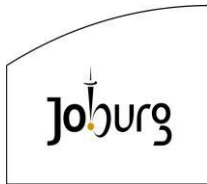
All Commissioning Spares must be tested during the first PLC panel FAT. The Contractor must keep these spares in the factory. When all PLCs have been handed over to Johannesburg Water, these commissioning spares must be handed over to the Johannesburg Water site maintenance manager.

PSZ 3.2.11 Maintenance Spares

The Contractor must supply the following maintenance spares to Johannesburg water once a practical handover has been achieved on the first completed PLC panel.

Item	Description	Reference	Description	Qty
1	Processors	BMEP582040	M580 processor level 2 for D&R (DISTRIBUTED & REMOTE) I/O	1
2	M580 Power Supplies	BMXCPS3500	HIGH POWER AC POWER SUPPLY	1
4	M580 Digital Inputs	BMXDDI6402K	DIG 64I 24 VDC SINK	1
		BMXDAI1615	DIG 16DI 220 VAC	1
5	M580 Digital Outputs	BMXDDO3202K	DIG 32Q TRANS SOURCE 0.1A	1
		BMXDRA1605	16 DO Relay card	1
6	M580 Analogue Modules	BMXAMI0810	ANA 8 U/I IN ISOLATED FAST	1
		BMXAMO0410	ANA 4 U/I OUT ISOLATED	1
7	M580 Accessories	ABE7S16E2M0	BAS REL ST W10 16I 230VAC ISOLATED	1
		ABE-7R16S210	Sub-base with 16 N/O Relay Contacts 5A, 1 x HE10	1
		ABE7CPA02	Sub-base for BMXAMI0810	1
		BMXRMS008MP	MEM CARD 8 MB	1
8	Additional Spares	TBC	24V Power Supply	1
			220V Supply SPD	1
			220V IO SPD	1

Employer:		Contractor:	
Witness:		Witness:	



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Volume 2A Scope of Work

			24V SPD	1
			4-20mA SPD	1
			Area Switch	1
			SFP	1

The “Additional Spares” (item 8) must have the same part numbers than the equipment supplied for the PLC panels.

PSZ 3.3 Documentation

PSZ 3.3.1 Hardware supply

User manuals - for all equipment supplied by the Contractor must be included in the O&M manual.

All instrument settings such as calibration settings, range settings, etc. plus calibration certificates must be included in the documentation.

Three copies of all documentation must be provided.

PSZ 3.3.2 Shop Drawings

Before PLC panel manufacturing or field junction box manufacturing can start, the successful tenderer must submit detailed panel layout (GA) drawings for approval by the Engineer.

PSZ 3.3.3 Commissioning Spares

The Contractor must supply the commissioning spares (see item PSZ3.2.10) before the first PLC panel factory acceptance test is attempted. A cession to Johannesburg Water for this equipment must be approved before the Contractor can claim for the cost of the commissioning spares.

PSZ 3.3.4 Method Statements

Where the Contractor is required to do work in an existing PLC panel, a detailed method statement must be approved by the Engineer prior to carrying out the work.

PSZ 3.4 INSTRUMENTATION

PSZ 3.4.1 Instrumentation List

Instruments required to be supplied, delivered, installed, and commissioned for this scope of work are indicated in the table below.

Employer:		Contractor:	
Witness:		Witness:	



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Item	PLC	Tag No.	Equipment Description	Equipment Type
1	Level Meters (refer to the Johannesburg Water automation and control design standards for level meters (volume 9))			
1.1	NW0501PST01	01-LIT003	Balancing Tank 2 Inlet Chamber Level	Ultrasonic Level
1.2	NW0501PST01	01-LIT004	Balancing Tank 2 Level1	Ultrasonic Level
1.3	NW0501PST01	01-LIT005	Balancing Tank 2 Level2	Ultrasonic Level
1.4	NW0506CHL01	06-LIT003	Chemical Dosing Tank 3 Level	Ultrasonic Level
1.5	NW0508ELT01	08-LIT005	Recirculation Sump1 Level	Ultrasonic Level
Item	PLC	Tag No.	Equipment Description	Equipment Type
1.6	NW0508ELT01	08-LIT006	Mixing Tank 2 Level	Ultrasonic Level
1.7	NW0508ELT01	08-LIT007	Recirculation Sump2 Level	Ultrasonic Level
1.8	NW0508ELT01	08-LIT008	Sludge Holding Tank Level	Ultrasonic Level
1.9	NW0508ELT01	08-LIT009	Odour Control Effluent Tank Level	Ultrasonic Level
1.10	NW0580BIO02	80-LIT002	Chemical Dosing Tank Level	Ultrasonic Level
2	Clamp on Flow Meters (refer to the Johannesburg Water automation and control design standards for flow meters (volume 8))			
2.1	NW0501PST01	01-FIT002	Balancing Tank 2 Outflow	Clamp-On Flow meter
2.2	NW0501PST01	01-FIT005	Balancing Tank Flow Divider To Reactor 2 Flow	Clamp-On Flow meter
2.3	NW0580BIO02	80-FIT002	WAS Flow	Clamp-On Flow meter
2.4	NW0508ELT01	08-FIT001	Sludge from PSTs Flow	Clamp-On Flow meter
2.5	NW0508ELT01	08-FIT005	Recycle Sump 1 Pump1 Flow	Clamp-On Flow meter
2.6	NW0508ELT01	08-FIT006	Recycle Sump 1 Pump2 Flow	Clamp-On Flow meter
2.7	NW0508ELT01	08-FIT013	Recirculation Sump2 Pump1 Flow	Clamp-On Flow meter
2.8	NW0508ELT01	08-FIT014	Recirculation Sump2 Pump2 Flow	Clamp-On Flow meter
2.9	NW0508ELT01	08-FIT015	Wasting Pump 1 Flow	Clamp-On Flow meter

Employer:		Contractor:	
Witness:		Witness:	



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Volume 2A Scope of Work

2.10	NW0508ELT01	08-FIT016	Wasting Pump 2 Flow	Clamp-On Flow meter
2.11	NW0508ELT01	08-FIT017	Wasting Pump 3 Flow	Clamp-On Flow meter
3	Magnetic Flow Meters (refer to the Johannesburg Water automation and control design standards for flow meters (volume 8))			
3.1	NW0580BIO02	80-FIT004	Reactor 2 Chemical Dosing Flow 2	Magnetic Flow Meter - 0.074l/s 20NB
3.2	NW0508ELT01	08-FIT002	Elutriant Sump 1 Pump Flow	Magnetic Flow Meter – 200-300NB
3.3	NW0508ELT01	08-FIT007	Sludge Recirculation Sump1 Transfer Pumps Flow	Magnetic Flow Meter - 200-300NB
3.4	NW0508ELT01	08-FIT008	Sludge Recirculation Sump2 Transfer Pumps Flow	Magnetic Flow Meter - 200-300NB
3.5	NW0508ELT01	08-FIT009	Wasting Pumps Flow	Magnetic Flow Meter - 200-300NB
Item	PLC	Tag No.	Equipment Description	Equipment Type
3.6	NW0508ELT01	08-FIT010	Odour Control Recirculation Flow NOT REQUIRED	Magnetic Flow Meter - 150l/min 40NB
3.7	NW0508ELT01	08-FIT011	Odour Control Effluent Flow NOT REQUIRED	Magnetic Flow Meter - 20l/min 40NB
3.8	NW0508ELT01	08-FIT012	Odour Control Drain Flow NOT REQUIRED	Magnetic Flow Meter - 2.5m ³ /day 15NB
4	Area Velocity Flow Meters (refer to the Johannesburg Water automation and control design standards for flow meters (volume 8))			
4.1	NW0580BIO02	80-FIT001	RAS Flow	Area/Velocity Flow meter – 1000mm wide x 1000mm high
5	Gas Flow Meters (refer to the Johannesburg Water automation and control design standards for flow meters (volume 8)) NOT REQUIRED			
6	Mixed Liquor Suspended Solids (refer to the Johannesburg Water automation and control design standards for mixed liquor suspended solids analysers (volume 13))			
6.1	NW0580BIO02	80-AIT001	Bio2 Mixed Liquor Suspended Solids	Mixed Liquor Suspended Solids
7	Dissolved Oxygen (refer to the Johannesburg Water automation and control design standards for dissolved oxygen analysers (volume 12))			
7.1	NW0580BIO02	80-AIT002 and 80-TIT001	Bio2 Dissolved Oxygen 1 and Temperature	Dissolved Oxygen

Employer:		Contractor:	
Witness:		Witness:	



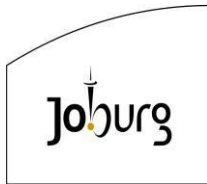
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7.2	NW0580BIO02	80-AIT003 and 80-TIT002	Bio2 Dissolved Oxygen 2 and Temperature	Dissolved Oxygen
7.3	NW0580BIO02	80-AIT004 and 80-TIT003	Bio2 Dissolved Oxygen 3 and Temperature	Dissolved Oxygen
8	Phosphate Analyser (refer to the Johannesburg Water automation and control design standards for phosphate analysers (volume 15))			
8.1	NW0505EPS01	05-AIT008	Final Effluent Phosphate	Phosphate
8.2	NW0580BIO02	80-AIT005 and 80-AIT009	Bio1 and Bio2 Phosphate	Phosphate
9	Ammonia Analyser (refer to the Johannesburg Water automation and control design standards for ammonia analysers (volume 16))			
9.1	NW0505EPS01	05-AIT009	Final Effluent Ammonia	Ammonia
9.2	NW0580BIO02	80-AIT006 and 80-AIT010	Bio1 and Bio 2 Ammonia	Ammonia
10	COD Analyser (refer to the Johannesburg Water automation and control design standards for COD analysers (volume 18))			
10.1	NW0505EPS01	05-AIT010	Final Effluent COD	COD
Item	PLC	Tag No.	Equipment Description	Equipment Type
10.2	NW0580BIO02	80-AIT008	Bio1 COD	COD
10.3	NW0580BIO02	80-AIT012	Bio2 COD	COD
11	pH Analyser (refer to the Johannesburg Water automation and control design standards for pH Analyser (volume 10))			
11.1	NW0505EPS01	05-AIT012	Final Effluent pH Analyser	pH
12	Nitrate Analyser (refer to the Johannesburg Water automation and control design standards for nitrate analysers (volume 17))			
12.1	NW0505EPS01	05-AIT013	Final Effluent Nitrate Analyser	Nitrate
13	Conductivity Analyser (refer to the Johannesburg Water automation and control design standards for conductivity analysers (volume 24))			
13.1	NW0505EPS01	05-AIT014	Final Effluent Conductivity Analyser	Conductivity
14	Chlorine Analyser (refer to the Johannesburg Water automation and control design standards for chlorine analysers (volume 22))			
14.1	NW0505EPS01	05-AIT015	Final Effluent Chlorine Analyser	Chlorine
15	Suspended Solids (refer to the Johannesburg Water automation and control design standards for turbidity analysers (volume 14))			

Employer:		Contractor:	
Witness:		Witness:	



15.1	NW0505EPS01	05-AIT011	Final Effluent Suspended Solids	Suspended Solids
15.2	NW0580BIO02	80-AIT007	Bio1 Suspended Solids	Suspended Solids
15.3	NW0580BIO02	80-AIT011	Bio2 Suspended Solids	Suspended Solids

PSZ 3.4.2 Transducers (sensors) and Transmitters

Supply and install all the instruments in the instrument table (item PSZ3.4.1 above) and connect these instruments to the required PLC panels indicated in the same table (PLC Column).

PSZ 3.4.3 Field Junction Boxes for Instruments

Supply and install instrument junction boxes (IJBs) for all the Instruments as mentioned in item PSZ 3.4.1 above. The junction boxes will contain instrument transmitters, terminals, circuit breakers for local isolation, surge protection, etc.

PSZ 3.4.4 For the Final Effluent analyser room and the new Bio 1/Bio 2 analyser room, there will be only 1 IJB in each analyser room. All the analysers in each room must be wired to one IJB in that room, as indicated in the attached drawings. These IJBs will not contain instrument transmitters, only terminals, surge protection and circuit breakers.

All new instrument junction boxes (IJBs) must comply with the following Johannesburg Water automation and control design standards:

- Field Junction Boxes (volume 19)
- Clean power and surge protection (volume 5)
- Cabling (volume 6)
- Labelling (volume 25)

The cost of these IJBs must be included with the relevant instrument as indicated in the BOQ.

PSZ 3.5 Valve Control Panels

PSZ 3.5.1 Valve List

Valve ICPs required for this scope of work are indicated in the table below. These valves will be supplied and installed by others.

Item	PLC	Tag No.	Equipment Description
1	Motorised Open-Close Valves		
1.1	NW0501PST01	01-CLV001	PST5 Underflow Valve
1.2	NW0501PST01	01-CLV002	PST5 Underflow Valve
1.3	NW0504WST01	04-CLV002	WST2 Underflow Valve

Employer:		Contractor:	
Witness:		Witness:	



1.4	NW0505EPS01	05-CLV003	Penstock 2
1.5	NW0505EPS01	05-CLV004	Penstock 3
1.6	NW0508ELT01	08-CLV001	Recirculation Sump1 Valve
1.7	NW0508ELT01	08-CLV002	Recirculation Sump2 Valve
2	Motorised Modulating Valves		
2.1	NW0501PST01	01-FCV001	Balancing Tank 2 Outlet Sluice Gate
2.2	NW0501PST01	01-FCV002	Balancing Tank 2 Inlet Sluice Gate
2.3	NW0580BIO02	80-FCV001	WAS Flow Control Valve

PSZ 3.5.2 Instrument Control Panels for Valves

Supply and install instrument control panels (ICPs) for all the valves as mentioned in item PSZ 3.5.1 above. The instrument control panels will contain the pushbuttons, indication lamps, relays, terminals, circuit breakers for local isolation, surge protection, etc.

All new instrument control panels (ICPs) must comply with the following Johannesburg Water automation and control design standards:

- Field Junction Boxes (volume 19)
- Clean power and surge protection (volume 5)
- Cabling (volume 6)
- Labelling (volume 25)

PSZ 3.6 Instrumentation Cabling

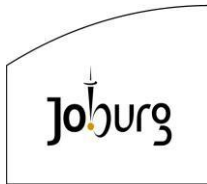
PSZ 3.6.1 Instrumentation Cables, Cable Trenches, and Cable Racking

Under this instrumentation, scope of work the tenderer must allow for the number of cables, trenches, racking, manholes and route markers indicated on the Bill of Quantities. Sizes and quantities indicated in the Bill Of Quantities are there to ensure sufficient funds are available for cabling and racking. These quantities must not be used for placing of orders. The Contractor must submit cable racking layouts for approval by the Engineer before any racking is ordered.

Where the BOQ refers to “Terminate”, this price must include all labour, testing and consumables. The quantity for this “Terminate” is regarded as the number of cables for which the cost (labour and consumables) must be allowed to terminate the two (2) ends of that cable. E.g. a quantity of 8 means 8 cables, each with two ends to be terminated (i.e. 16 ends in total).

All new instrument cabling and cabling installations must comply with the following Johannesburg Water automation and control design standards for cabling (volume 6).

Employer:		Contractor:	
Witness:		Witness:	



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PSZ 3.6.2. Scaffolding must be allowed for the Balancing Tank area (+-10m high, floor standing) and for the two (2) Elutration Pump Stations (+-10m high, floor standing).

PSZ 3.6.3. Where cabling with no mechanical protection (e.g. Cat-6 cable) is run in trenches or in open areas inside buildings (i.e. not inside panels), the cable must be run in stainless steel conduit (for trenches) or surface mounted trunking (inside buildings).

PSZ 3.7 Data Communication and Networking

The networking hardware listed in the table below must be supplied and installed. The cost of this equipment must be included in the relevant PLC cost in the BOQ.

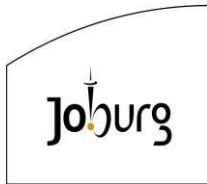
PLC Name	Description	QTY
Unit 5 Bioreactor 2	Area Switches	1
	LC Connector Patch Panel	1
New Unit 5 Elutration PLC	Area Switches	1
	LC Connector Patch Panel	1
New Main Intake Substation PLC	Area Switches with LC Connectors	1
New PST & Balancing PLC	Area Switches with LC Connectors	1
New Hypochlorite PLC	Area Switches with LC Connectors	1
New WST PLC	Area Switches with LC Connectors	1
New WAS Pumpstation PLC	Area Switches with LC Connectors	1
New Effluent PLC	Area Switches with LC Connectors	1
New Bioreactor 1 PLC	Area Switches with LC Connectors	1

An "Area Switch" shall consist of:

- A managed switch with at least 2 off 100BASE-TX RJ45 copper ports and at least two SPF ports
- 2 off multimode mode 1000BASE-LX SFP modules
- 2 off 3m single mode fibre patch leads
- 1 off 3m certified Cat-6 patch lead.
- 1 off 24VDC power supply.

The Contractor is primarily responsible for all fiber-optic and data communication testing and commissioning work. All testing and commissioning work shall be documented in detail as specified in the Johannesburg Water automation and control design standards for cabling (volume 6) and the results shall be verified and approved by the Engineer. The Contractor must invite the Engineer to witness the fibre optic testing at least 5 working days before fibre optic testing is carried out.

Employer:		Contractor:	
Witness:		Witness:	



The fibre-optic cables must be tested and commissioned after installation. The commissioning of the data network can commence after the fibre-optic cables have been commissioned.

All new networking equipment must comply with the Johannesburg Water automation and control design standards for networking (volume 7) and cabling (volume 6).

Intermediate patch and splice panels shall not be allowed unless approved by the Engineer. Microduct assemblies, micro fibre-optic cables or fibre-optic bundles that are found to be damaged either due to defective manufacturing, delivery or poor installation practice shall be replaced in their entirety at the cost of the Contractor. This emphasises the importance of testing cables before installation.

Claims for testing will only be considered for test results that has been approved.

PSZ 3.8 Fibre-Optic Cables

PSZ 3.8.1 Fibre-Optic Cables and Microduct Assemblies

Under this instrumentation, scope of work the tenderer must allow for the amount of cables and microduct assemblies indicated the Bill of Quantities. Sizes and quantities indicated in the Bill of Quantities are there to ensure sufficient funds are available for cables and microduct assemblies. These quantities must not be used for placing of orders.

Supply and install the following six pair single mode fiber-optic bundles:

From	To
Unit 5 Bioreactor 2	New HOW core switches

For the unit 5 bioreactor PLC, a 24-tube microduct assembly must be installed to route the fibre bundles from TDC42 to TDC43 and install a 2-tube microduct assembly from TDC43 to the unit 5 bioreactor 2 PLC Panel. Refer to JW13898-NET-CR02.

Where the BOQ refers to “Splice” or “Connection”, this price must include all labour and consumables. The quantity for this “Splice” or “Connection” is regarded as “per pair” or “per tube”, not “per end” of the fibre strand or tube. For example, one “Splice” of a 6-pair fibre-optic cable must include the cost (labour and consumables) to splice 12 fibre-optic cores at each of the two ends of the cable. Similarly, one “Connection” for a 24-tube microduct assembly will include the cost (labour and consumables) to connect 24 tubes at each of the 2 ends of the microduct assembly.

The minimum bending radii of the microduct assemblies shall not be exceeded.

All fiber-optic cable shall be terminated on patch panels at each end.
Eight cores (4 pairs) shall be terminated on a patch panel.
The remaining fibers will be neatly coiled in the patch panel as spares.

All new fibre-optic cabling must comply with the Johannesburg Water automation and control design standards for cabling (volume 6).

Employer:		Contractor:	
Witness:		Witness:	

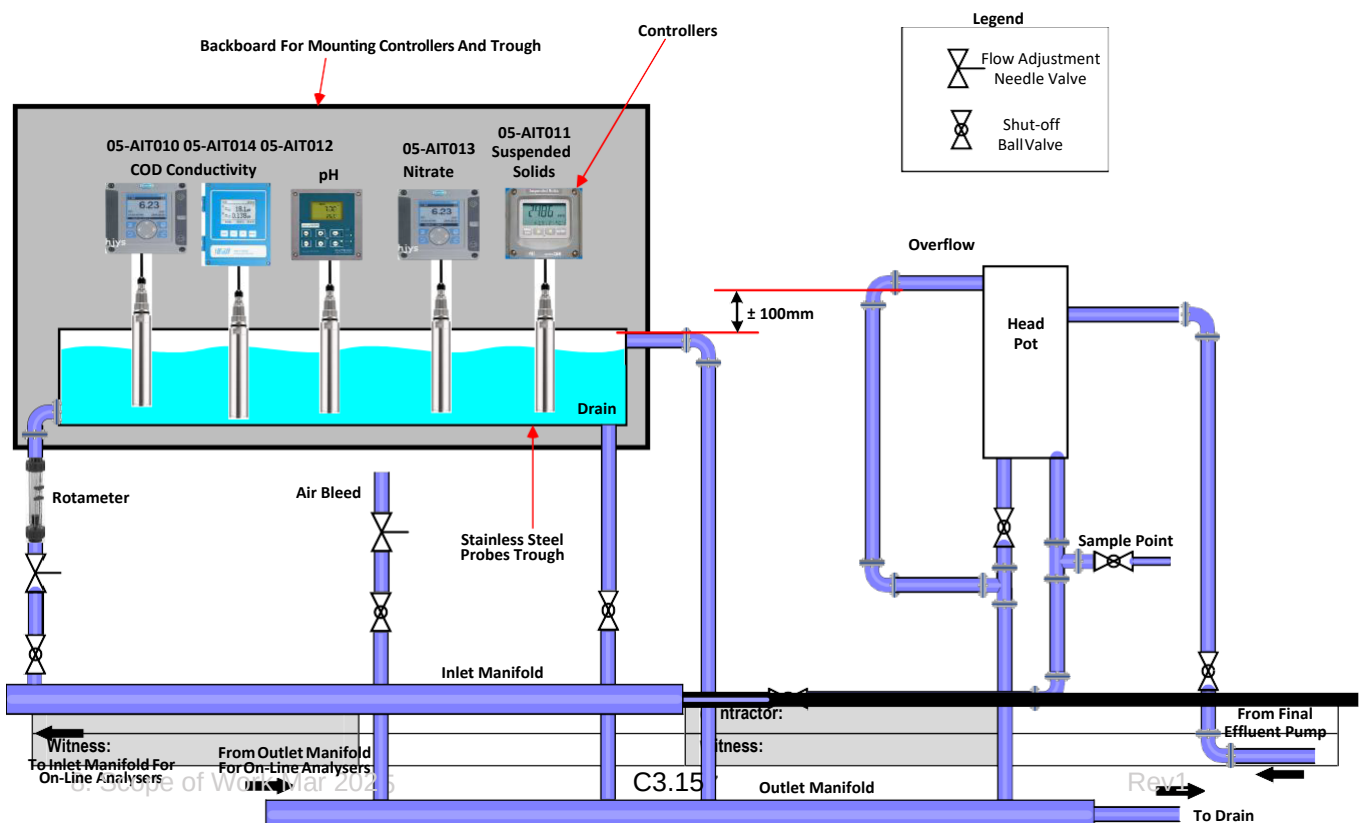
PSZ 3.9 Training

The tenderer must allow an amount to cover the cost of training of up to two Johannesburg Water personnel by the supplier (not only the Contractor) on new instrumentation supplied on this contract. Training will be by the supplier at the supplier's premises or on site. If no training is required, then this amount will not be claimed.

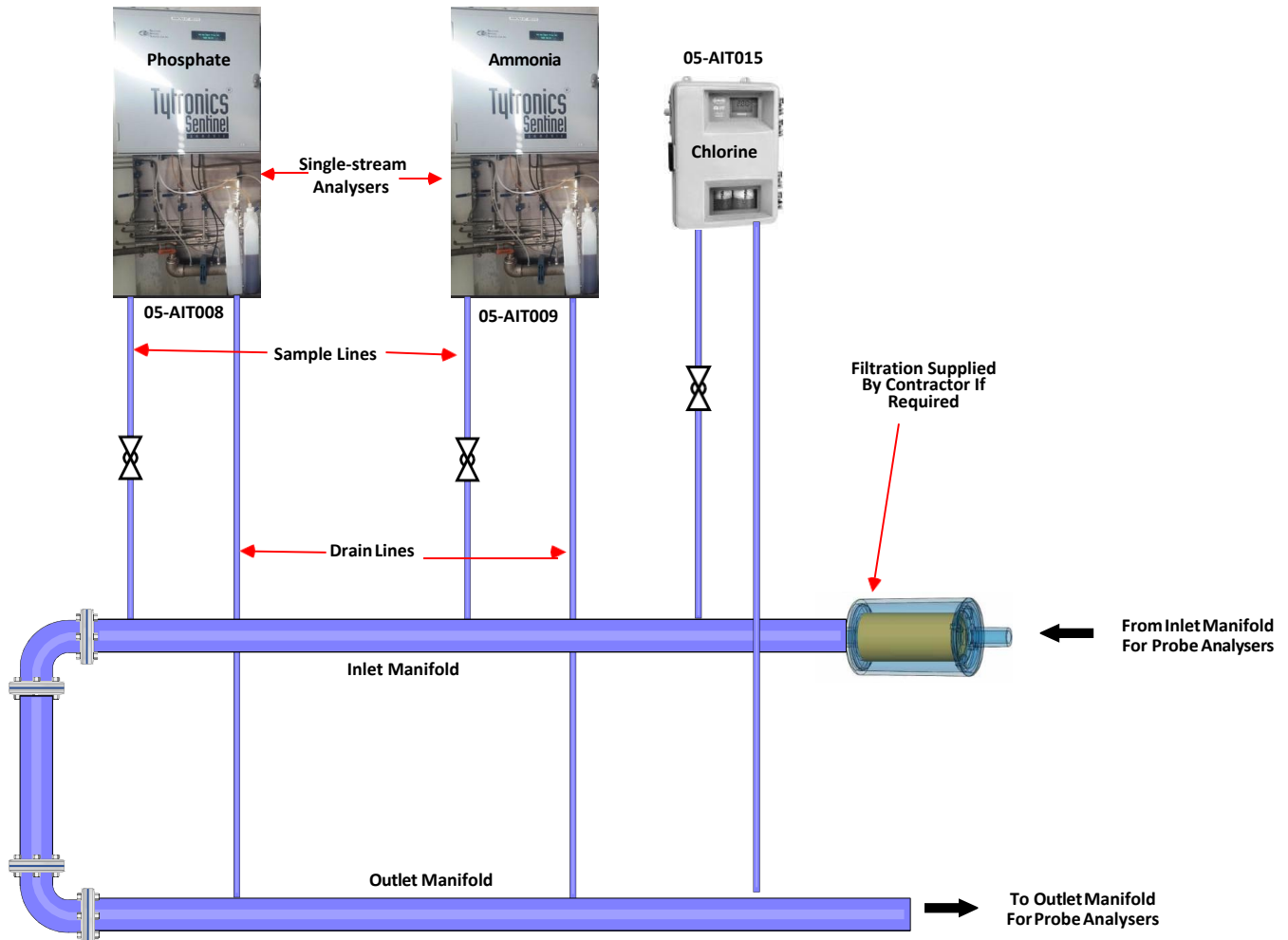
PSZ 3.10 Analyser Rooms

PSZ 3.10.1 The Final Effluent analyser room is an existing analyser room, where the analysers currently in there, must be removed and the new analysers (see item PSZ 3.4 Items 9.1, 10.1, 11.1, 12.1, 13.1, 14.1, 15.1 and 16.1) must be installed. There is existing power skirting with switched socket outlets. Where there are faults in the existing 230V AC power distribution, the contractor must rectify such faults or replace faulty equipment. All wiring and/or cabling between analysers and switched socket outlets, the power skirting, the DB and the IJB must be neatly run in surface-mounted trunking. No loose or exposed wiring or cabling will be accepted. Where reagents are used, proper brackets or stands must be manufactured and installed for these reagents (see the examples in item PSZ 6 C&I clarification pictures). A guide to the installation is shown in the two sketches below:

Probes In Final Effluent Analyser Room



Analysers In Final Effluent Analyser Room



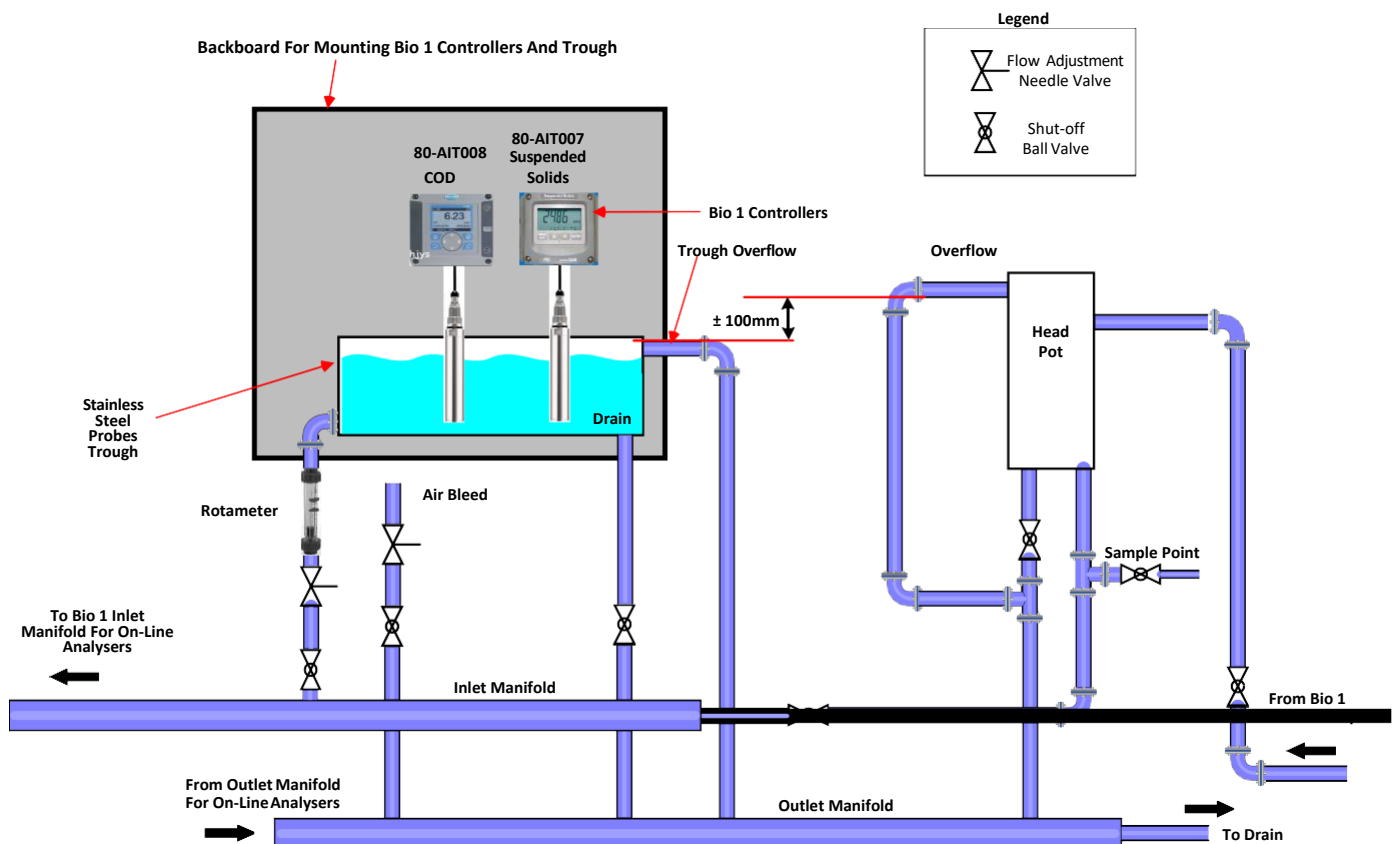
The sketches shown above will act as a guide to the contractor for pricing purposes only. After tender award, the contractor must discuss this design with the Engineer and then submit a design to the Engineer for approval before any orders are placed or any manufacturing for the analyser room is done.

NOTE: The specification states that a vortex separator and mechanical filter would be available at analyser rooms. No such equipment will be available for this analyser room and the contractor must supply all filtration required for the equipment installed under this project. Filtration must not be installed in the system for the probes, because suspended solids are measured and filtration will lead to false measurements. Filtration must only be installed for the on-line analysers if required.

Employer:		Contractor:	
Witness:		Witness:	

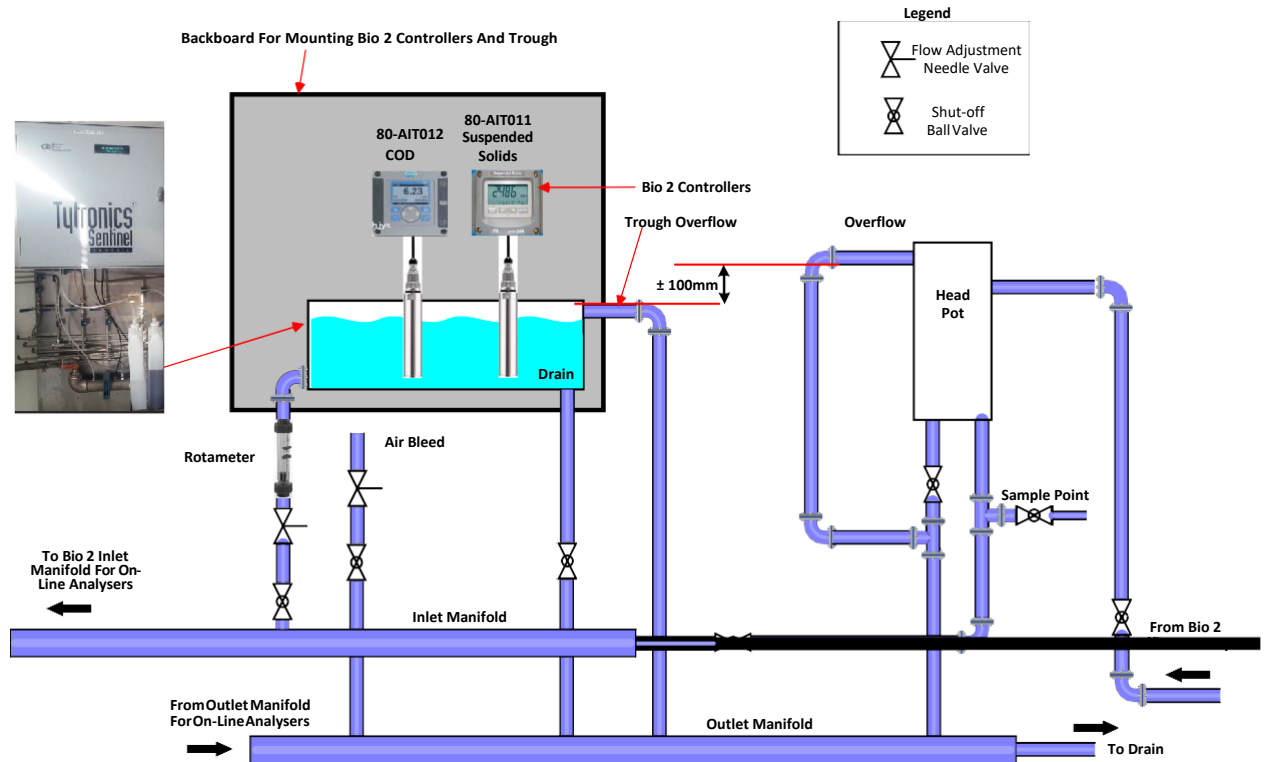
PSZ 3.10.2 The new Bio 1/Bio 2 Effluent analyser room is an existing empty room. The new analysers (see item PSZ 3.4 Items 9.2, 10.2, 11.2, 16.2, 12.3 and 16.3) must be installed. There is existing power skirting with switched socket outlets. Where there are faults in the existing 230V AC power distribution, the contractor must rectify such faults or replace faulty equipment. All wiring and/or cabling between analysers and switched socket outlets, the power skirting, the DB and the IJB must be neatly run in surface-mounted trunking. No loose or exposed wiring or cabling will be accepted. Where reagents are used, proper brackets or stands must be manufactured and installed for these reagents (see the examples in item PSZ 6 C&I clarification pictures). A guide to the installation is shown in the three sketches below:

Probes In Bio 1/Bio 2 Analyser Room

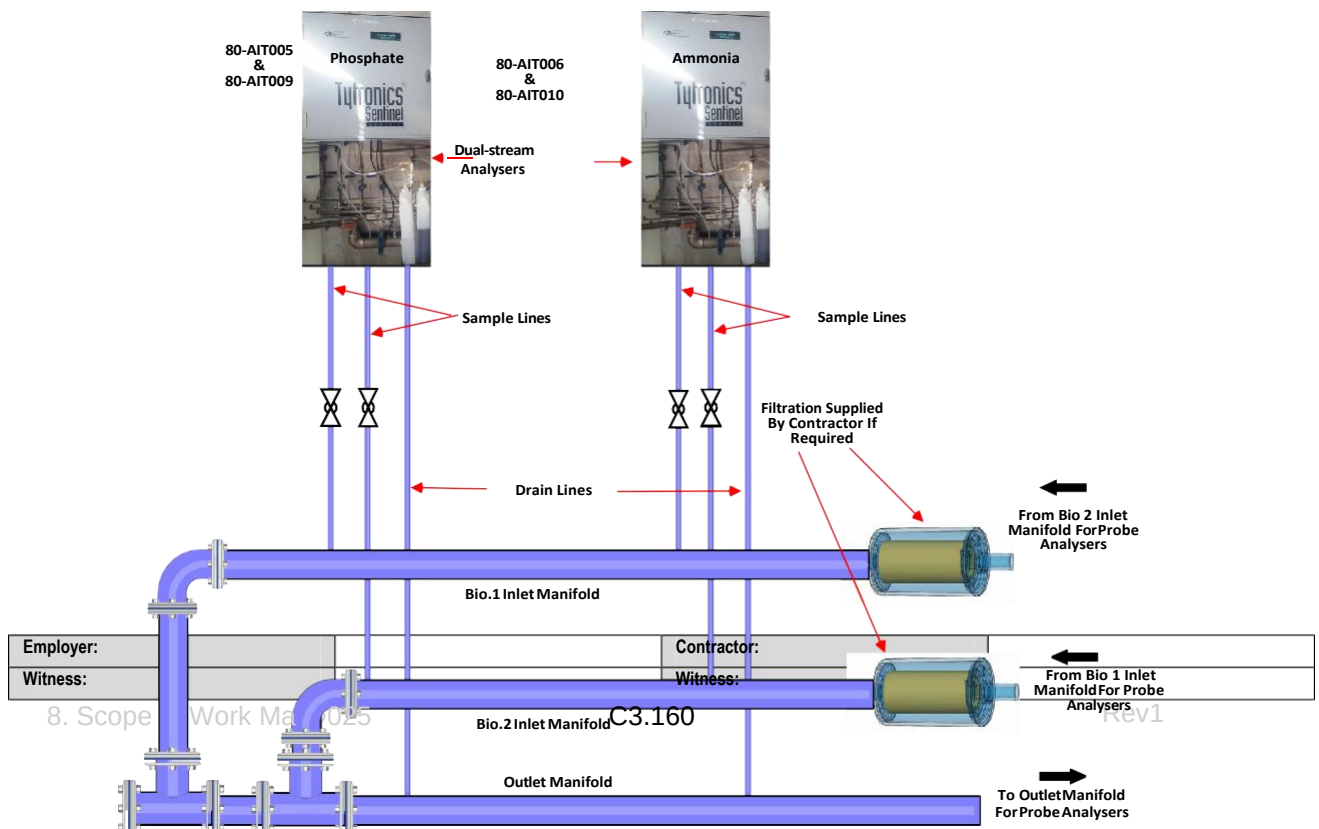


Employer:		Contractor:	
Witness:		Witness:	

Probes In Bio 1/Bio 2 Analyser Room



Analysers In Bio 1/Bio 2 Analyser Room





CONTRACT: JW13897
NORTHERN WASTEWATER TREATMENT WORKS
EXPANSION OF CAPACITY UNIT 5 – INSTALLATION OF
MECHANICAL AND ELECTRICAL EQUIPMENT



Volume 2A Scope of Work

The sketches shown above will act as a guide to the contractor for pricing purposes only. After tender award, the contractor must discuss this design with the Engineer and then submit a design to the Engineer for approval before any orders are placed or any manufacturing for the analyser room is done.

NOTE: The specification states that a vortex separator and mechanical filter would be available at analyser rooms. No such equipment will be available for this analyser room and the contractor must supply all filtration required for the equipment installed under this project.

In the “C&I Clarification Pictures” section (see item PSZ 6) are some examples of the standard expected for analyser room installations.

PSZ 3.11 Applicable SANS Standards

The Standard Specifications for all associated electrical and instrumentation work applicable to this Contract shall be SANS 10142-1:2003:

This Specification is not issued with this volume but is available at the Contractor's expense from: Standards South Africa,

Office Address:

1 Dr Lategan Road, Groenkloof, PRETORIA

Postal Address:

Private Bag X191, PRETORIA, 0001

Telephone: National: (012) 428-6883

International: + 27 12 428 6883

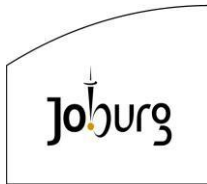
Telefax:

National: (012) 428-6928

International: + 27 12 428 6928

Email: sales@sabs.co.za

Employer:		Contractor:	
Witness:		Witness:	



PSZ 3.12 Particular Generic Specifications

The following Particular Generic Specifications forming part of the Contract have been written to cover phases or items of work involving a specialist type of operation or material to be encountered on this Contract and that are not adequately covered by the general specifications.

Description	Volume	Revision
PLC Panels	3	15
Clean Power And Surge Protection	5	14
Cabling	6	17
Networking	7	15
Flow Measurement	8	18
Level Measurement	9	14
pH Measurement	10	15
Temperature Measurement	11	13
Dissolved Oxygen Measurement	12	14
Mixed Liquor Suspended Solids Measurement	13	14
Turbidity/Suspended Solids Measurement	14	14
Phosphate Analysing	15	13
Ammonia Analysers	16	13
Nitrate Measurement	17	14
Chemical Oxygen Demand Measurement	18	13
Field Junction Boxes	19	19
Density Measurement	20	13
Chlorine Analysing	22	8
Conductivity Measurement	24	5
Labelling	25	3

The listed specifications are included in this tender document.

PSZ 3.13 Plant and Materials

All materials intended for the purpose of this Contract shall bare the approval of the relevant SANS specifications. Any deviations there from shall be recorded and reported by the Contractor.

PSZ 3.14 Data Sheets

All the data sheets required for equipment (such as flow meters, level meters, surge protection devices, power supplies, etc.) as required in the Automation and Control Design Standards must be completed and submitted with the tender (returnable documents). Incomplete or missing data sheets will result in the disqualification of a tenderer.

PSZ 4 QUALITY ASSURANCE

PSZ 4.1 QA Plans

The contractor must submit a quality assurance plan before manufacturing for approval by the engineer.

Employer:		Contractor:	
Witness:		Witness:	



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PSZ 4.2 Factory Acceptance Tests

Part of the QA plan must include factory acceptance tests of the PLC panels, Instrument Control Panels and Instrument Junction Boxes at the manufacturer's premises. These panels, ICPs and IJBs must undergo a similar test after delivery on site. The test procedures to be followed during these tests must be submitted for the approval of the engineer. The engineer must be notified no less than 5 working days in advance of such planned inspections.

PSZ 5 C&I PROGRAM

When compiling his program, the Contractor has to take the following C&I activities and associated durations into account:

NORTHERN WORKS UNIT 5 MODULE 2 – JW13898 - C&I Program

Task Name	Duration
Obtain data sheets for all instruments, surge protection, power supplies, UPSs, etc. (Hold Point).	3 days
Approve C&I equipment so that contractor can place orders.	15 days
Obtain detailed connection diagrams from contractor for all instruments and do detailed C&I designs. (Hold Point).	10 days
Obtain PLC panel GAs for approval. (Hold Point).	10 days
Discuss, alter if required and approve PLC Panel GAs.	13 days
Obtain Field JB GAs for approval. (Hold Point).	10 days
Discuss, alter if required and approve Field JB GAs.	10 days
Obtain control philosophy	2 days
WSP develop functional specifications.	30 days
Submit functional specifications to contractor and client for comment/approval.	15 days
WSP update functional specifications with contractor & client comments.	10 days
WSP develop PLC & SCADA software.	30 days
WSP do presentation of PLC & SCADA control to Client	10 days
WSP update PLC & SCADA software after presentation.	10 days
Check metalwork of PLC panels before painting. (Hold Point).	2 days
Check painting of PLC panels and equipment layouts before mounting of equipment. (Hold Point).	2 days
Do PLC panel FATs. (Hold Point).	10 days
Check metalwork of Field JBs before painting. (Hold Point).	2 days
Check painting of Field JBs and equipment layouts before mounting of equipment. (Hold Point).	2 days

Employer:		Contractor:	
Witness:		Witness:	



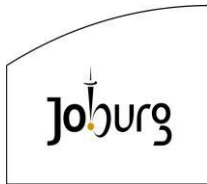
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Volume 2A Scope of Work

Do Field JB FATs. (Hold Point).	5 days
Commissioning	Duration
Do PLC I/O loop checks (to verify after contractor has completed his checks).	10 days
Fiber Optic Testing	3 days
Do cold commissioning (if applicable).	5 days
Do hot commissioning.	45 days
Do handover checks and produce snag lists. (Practical handover).	8 days
Contractor to rectify snags.	15 days
Contractor to submit red-lined drawings.	15 days
Produce "As-Built" documentation.	15 days
Complete all relevant project close-out documentation.	10 days

Employer:		Contractor:	
Witness:		Witness:	



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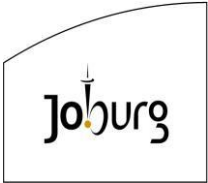


Volume 2A Scope of Work

PSZ 6 C&I CLARIFICATION PICTURES

The pages below contain some pictures to assist with clarification of the C&I scope of work.

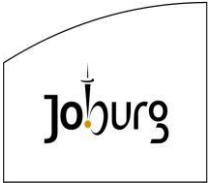
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Witness:		Witness:	



NSW Unit 5



Employer:		Contractor:	
Witness:		Witness:	



All the PLCs shown here, except for the two HOW PLCs, form part of this project.

OUTDATED SCHNEIDER PREMIUM PLC Unit 5 Module 1 PLC-02



Unity processor, Modicon Premium,
transparent ready, Unity Pro

TSXP572634M

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❗ **Discontinued on:** 9 July 2018 ⓘ
❗ **End-of-service on:** 31 Dec 2023 ⓘ

Recommended replacement(s)

TSXP572634M is replaced by:



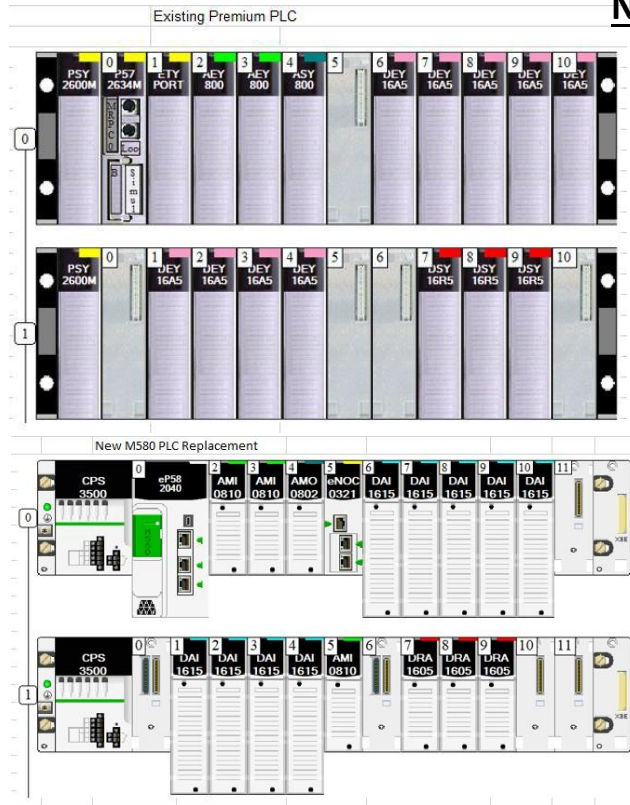
standalone processor, Modicon M580,
digital, 512 analog
BM5P582020



Currently Module 1 Bioreactor PLC is being stripped for spares as required elsewhere. Bioreactor 1 PLC must be replaced with a new M580 PLC and like-for-like I/O.

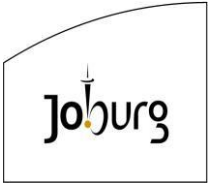
Employer:		Contractor:	
Witness:		Witness:	

NSW Unit 5 Module 2 – PSTs & Balancing Tank PLC-01



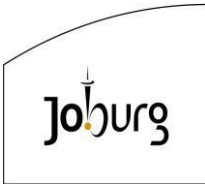
The existing premium PLC must be replaced with a new M580 PLC and like-for-like I/O. Additional I/O modules must be installed for Balancing Tank 2. If additional space is required (e.g. terminals, SPDs, etc.) MCC tier 8, right next to the PLC panel will be used.

Employer:		Contractor:	
Witness:		Witness:	

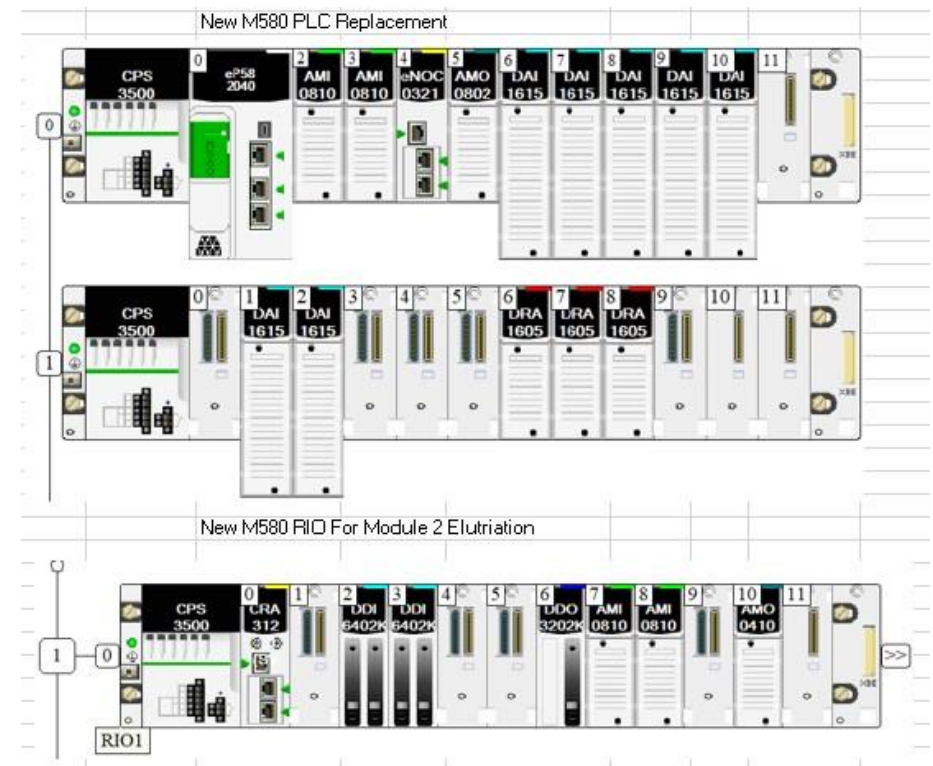
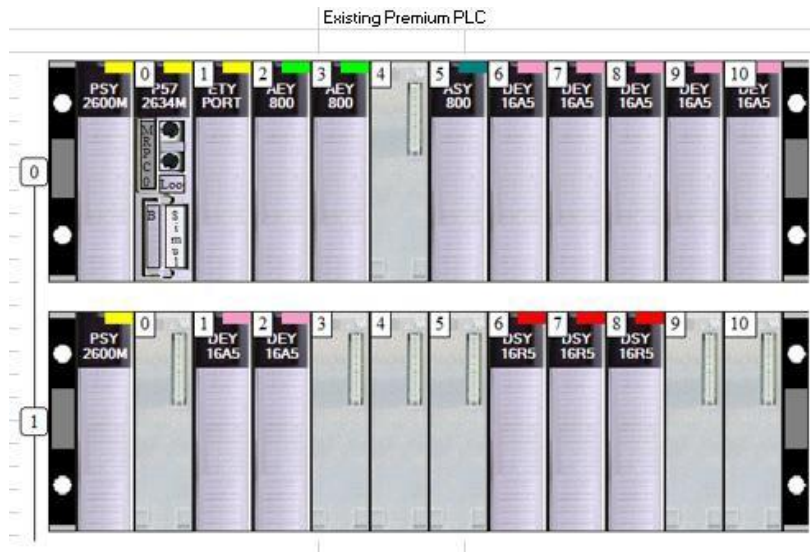


Volume 2A Scope of Work

Employer:		Contractor:	
Witness:		Witness:	

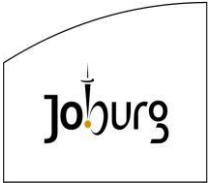


NSW Unit 5 Module 2 – Elutriation PLC-08

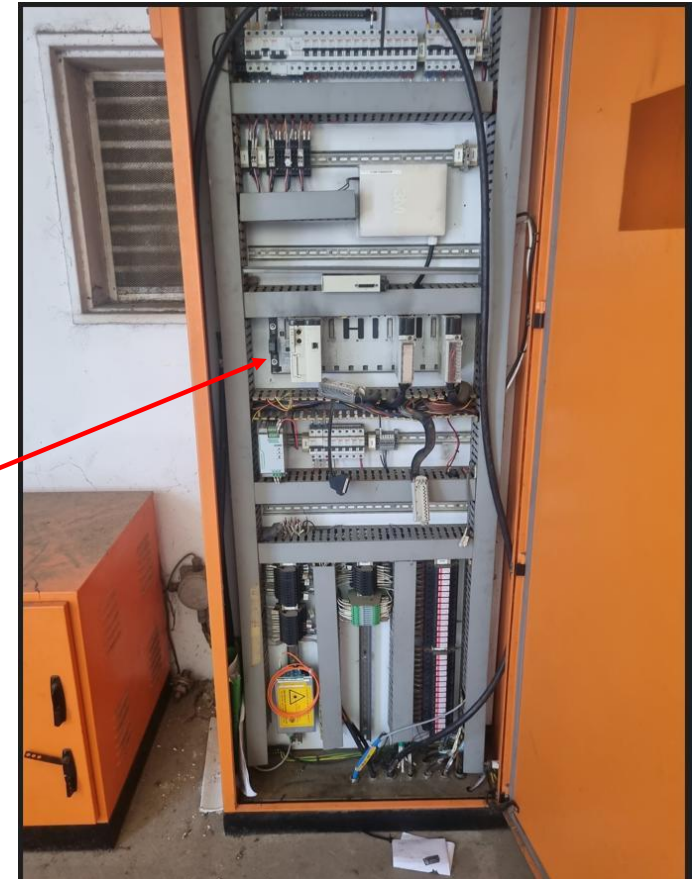
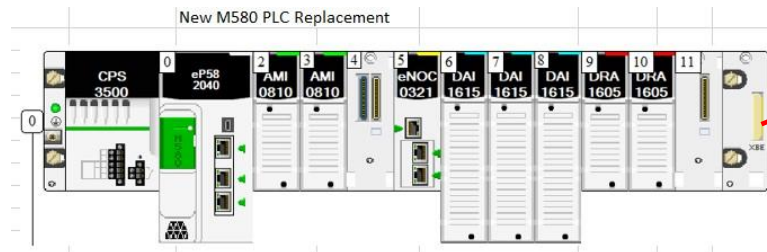
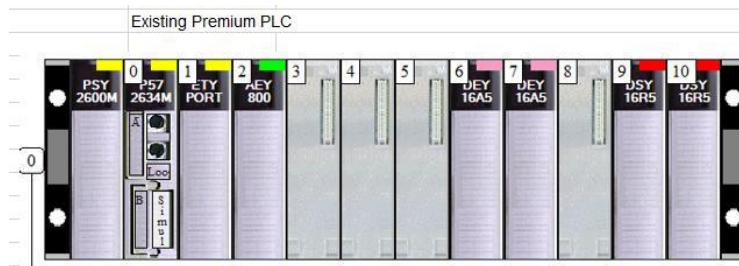


The existing PLC must be replaced with a new M580 PLC and like-for-like I/O. A new wall-mounted panel with new remote I/O for Module 2 Elutriation must be supplied and installed.

Employer:		Contractor:	
Witness:		Witness:	

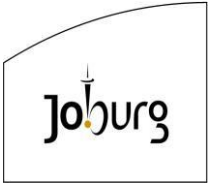


NSW Unit 5 – Final Effluent PLC-05

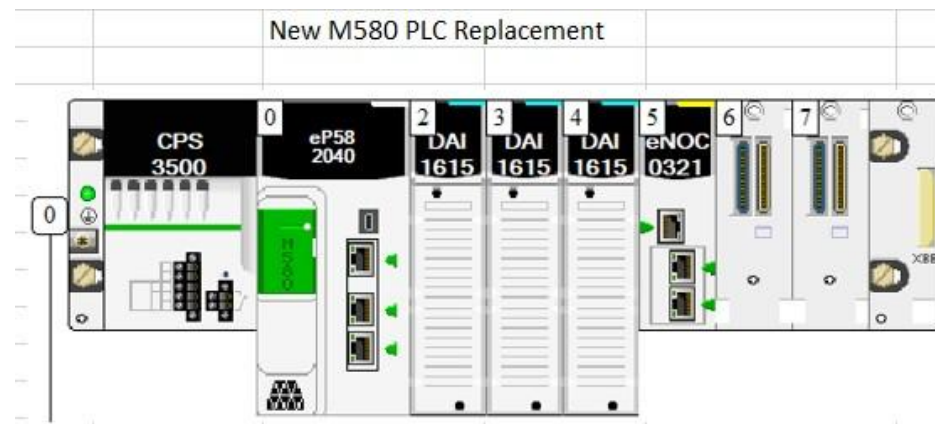
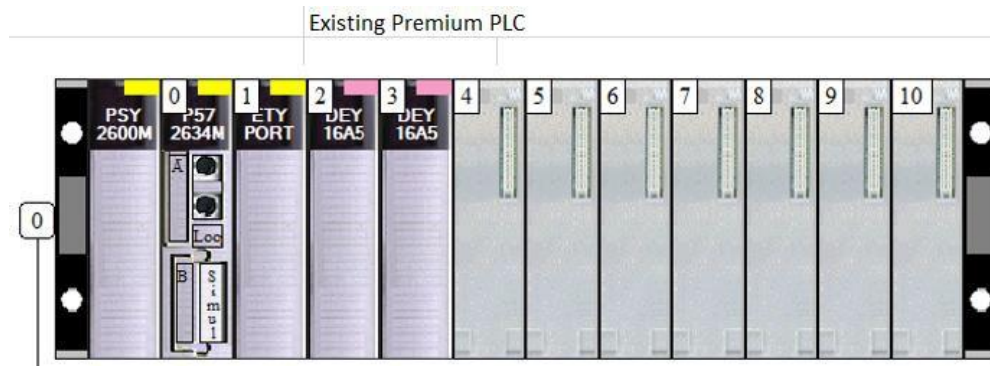


The existing premium PLC must be replaced with a new M580 PLC and like-for-like I/O, plus new I/O for new Final Effluent equipment.

Employer:		Contractor:	
Witness:		Witness:	

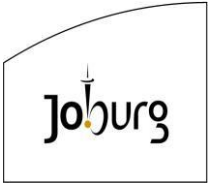


NSW Unit 5 – Main Intake Sub PLC-07

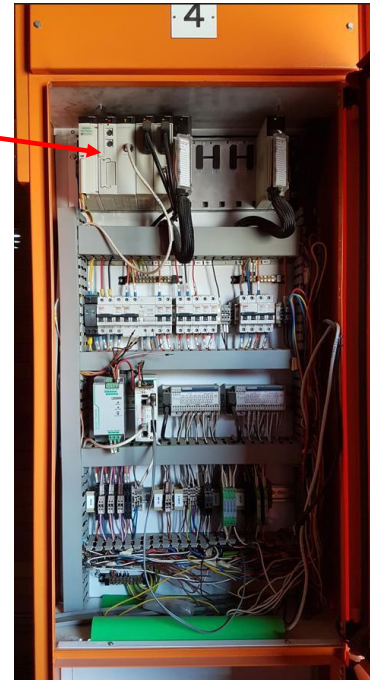
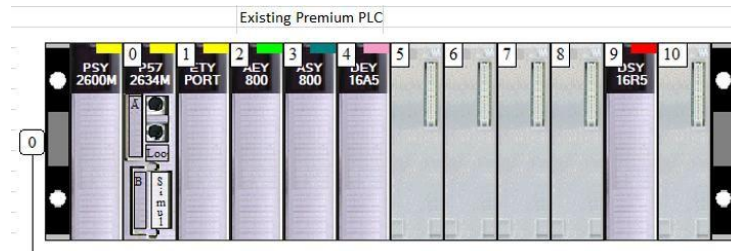


A new wall-mounted enclosure must be supplied & installed to house the replacement M580 PLC and like-for-like I/O. Additional I/O must be added for new equipment.

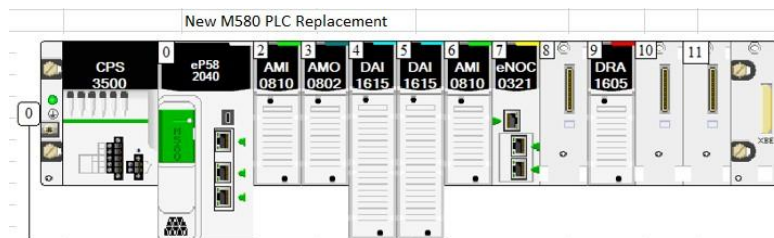
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NSW Unit 5 – Hypochlorite PLC-06



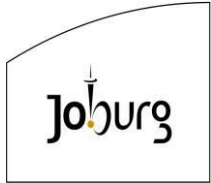
Top end of the existing PLC panel. Here the existing PLC must be replaced, and like-for-like I/O cards installed. Additional I/O cards must be added for the new Mod.2 dosing.



Bottom end of the existing PLC panel. It must contain the new I/O terminals & SPDs.

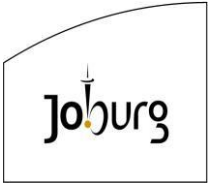


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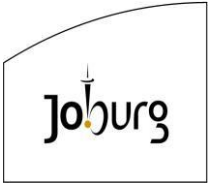
Volume 2A Scope of Work

Employer:		Contractor:	
Witness:		Witness:	

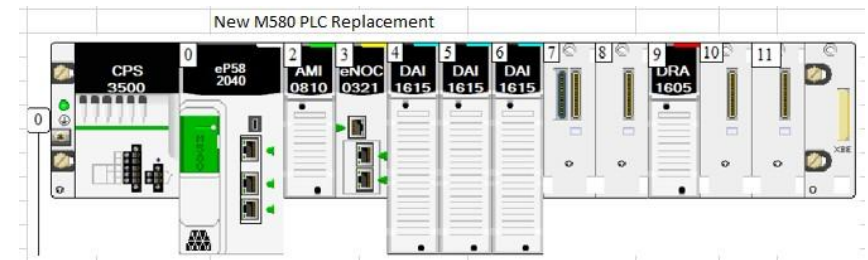
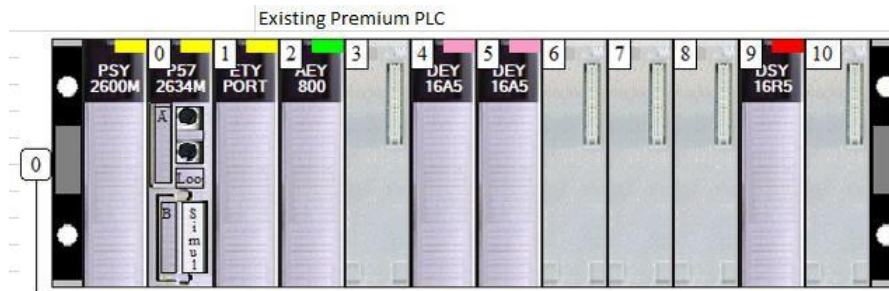


Volume 2A Scope of Work

Employer:		Contractor:	
Witness:		Witness:	

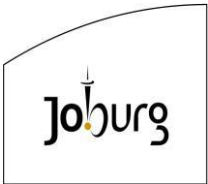


NSW Unit 5 – WAS Pump Station PLC-03



The existing PLC panel must be equipped with a new M580 PLC and like-for-like I/O. Existing and new I/O must be wired to this new system.

Employer:		Contractor:	
Witness:		Witness:	



EXAMPLES OF ANALYSER ROOM LAYOUTS



Employer:		Contractor:	
Witness:		Witness:	