Contract JW14508

MAYFAIR WATER PIPE REPLACEMENT

TENDER COVER PAGE **MBD 1**

YOU ARE HEREBY INVITED TO BID FOR REQUIREMENTS OF JOHANNESBURG WATER

BID NUMBER: JW14508 **CLOSING DATE: 19 MAY 2026** **CLOSING TIME: 10:30 AM**

MAYFAIR WATER PIPE REPLACEMENT

CIDB REQUIREMENTS: TENDERERS SHOULD HAVE A CONTRACTOR CIDB GRADING OF 8CE OR HIGHER

BRIEFING SESSION	**COMPULSORY**
BRIEFING DETAILS	**DATE AND TIME: 23 APRIL 2026 AT 11:00 AM** **ADDRESS: JW LANGLAAGTE DEPOT, 2 LINK ROAD, LANGLAAGTE** **VENUE: KITCHEN AREA**
TENDER SUBMISSION DETAILS	**TENDERS RECEIVED FROM NON-ATTENDED BIDDERS OF A COMPULSORY BRIEFING SESSION WILL NOT BE ACCEPTED** **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	**Nosipho Phakathi**	**CONTACT PERSON**	**Gcina Ndela**
TELEPHONE NUMBER	**011 688 1921**	**TELEPHONE NUMBER**	**011 688 1796**
E-MAIL ADDRESS	**Nosipho.phakathi@jwater.co.za**	**E-MAIL ADDRESS**	**Gcina.Ndela@jwater.co.za**

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: ……...

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.

Contract JW14508
MAYFAIR WATER PIPE REPLACEMENT
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. **JW14508 MAYFAIR WATER PIPE REPLACEMENT**

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 10 APRIL 2026.

The Employer is Johannesburg Water

All tenders and supporting documents must be sealed and placed in the Tender box on the ground floor of the Johannesburg Water by no later than 10:30 am on 19 May 2026.

Address is as follows:

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

Johannesburg Water (SOC) Ltd is not obliged to accept the lowest or any tender and Johannesburg Water reserves 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 Johannesburg Water has awarded the contract. Johannesburg Water (SOC) Ltd and the successful tenderer/s will sign the Letter of Award which together with the submitted tender document will form the contract.

Johannesburg Water SOC Ltd

CONTRACT NO: JW14508

MAYFAIR WATER PIPE REPLACEMENT

VOLUME 1

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

No	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, minimum required CIDB grading for the tender and Active Status – if applicable	•			
	COIDA Registration Number			•	
	Tax SARS PIN No.		•		
	MAAA No. for Tax Compliant Status		•		
	Bank Details Form		•		
2.	**Mandatory Documents at Particular Stage:**				
	CIDB – Grading 8CE or Higher	•			
	Mandatory Briefing Meeting	•			
	Form of Offer Completed and Signed	•			
	Financial Capacity	•			
3.	**Administrative Documentation:**				
	Signed Certificate of Authority to Sign	•			
	Signed Acknowledgement of Tender Conditions	•			
	MBD 1 - Invitation to Bid - Completed and signed		•		
	MBD 4 - Declaration of interest - Completed and signed		•		
	MBD 5 - Declaration for procurement above R10 Million (all applicable taxes included) Completed and signed.		•		
	MBD 6.1 - Preference Points Schedule – Specific Goals and Price Points - Completed and signed.		•		
	MBD 8 - Bidder's past supply chain management practices – Completed and signed.		•		
	MBD 9 - Certificate of Independent Bid Determination – Completed and signed.		•		
	Municipal Rates and Taxes for the **Tenderer** - Current municipal rates for the entity not older than 90 days (if leasing/renting, submitted proof such as lease agreement where premises are		•		

No	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)
	rented), OR Confirmation that suitable arrangements are in place for arrear municipal obligations with your local municipality.				
	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.		•		
	T 2.3.2 Returnable Annexure B: Acknowledgement of Tender Drawings	•			
	T 2.3.1 Returnable Annexure A: Acknowledgement of SHE Specification & Annexures	•			
	3-year financial statements (audited where applicable)		•		
	Joint Venture Consortium or equivalent Agreement signed by all parties if applicable	•			
	Any qualifications. If “Yes”, reference to such qualification/s must be indicated on a cover letter. Please be aware that alterations on the tender document may result in your tender being **eliminated as the qualification may impede on the ability to evaluate like with like.**	•			
	Occupational Health and Safety Declaration form	•			
4.	**Functionality Documentation:**				
	Documentary Evidence Required for Technical Criteria – **Reference Letters and completion certificates**	•			
5.	**Specific Goals:**				
	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**	•			
	Documentary Evidence Required for	•			

No	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)
	Criteria 1 - **Valid Construction Sector BBBEE Certificate issued by SANAS accredited verification agency**				
6.	**Scope of Work**				
	Scope of Work and or Specifications	•			
7.	**Pricing Schedule:**				
	Bill of quantities completed	•			
	Alterations authenticated – Refer to Acknowledgment of Tender Conditions	•			
8.	**Terms and Conditions:**				
	General Conditions of Contract	•			
	Special Conditions of Contract	•			
9.	**Other Documents**				
	Letter of Award			•	
	Public Liability Insurance			•	
	Valid Registration with Compensation for Occupation Injuries and Diseases Act			•	
	Performance Security – where applicable for industrial related services			•	
	Resolution Letter for the Subcontractor (a letter authorizing the person completing the tender to sign on behalf of the company) – if applicable		•		
	Comprehensive Health and Safety Plan (compliance with OHSE Specification - if applicable			•	

Tenderers will be notified of such missing and incomplete 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 documents that require completion and signatures that do not have a bearing 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_____

City of Johannesburg

Johannesburg Water SOC Ltd

Turbine Hall
65 Ntemi Piliso Street
Newtown
Johannesburg

Johannesburg Water
PO Box 61542
Marshalltown
2107

Tel +27(0) 11 688 1400
Fax +27(0) 11 688 1528

www.johannesburgwater.co.za

JOHANNESBURG WATER POPIA PRIVACY STATEMENT

In terms of the Protection of Personal Information Act, 213 (Act 4 of 2013), also called the POPI Act or POPIA, Johannesburg Water SOC Limited, undertakes all reasonable measures to protect personal information and to keep it private and confidential.

1. Privacy Notice applies to:

Suppliers, vendors, contractors, service providers, etc whether appointed or prospective.

2. Definitions of personal information

According to the Act “personal information” means information relating to an identifiable living, natural person, and where it is applicable, an identifiable, existing juristic person. All addresses including residential, postal and email addresses.

3. About the Public Entity

Johannesburg Water (SOC) Limited, registration number 2000/029271/30

3.1 The information we collect

We collect information directly from you where you provide us with your personal details. Where possible, we will inform you what information you are required to provide to us and what information is optional.

3.2 How Johannesburg Water use your information

We will use your personal information only for the purposes for which it was collected and agreed with you. For example: to gather contact information, to confirm and verify your identity, for the evaluation and adjudication of bids and quotations for tenders, request for quotations, and other personal information for the procurement of goods and services by the Entity.

3.3 Disclosure of information

We may disclose your personal information to our Shareholder, the City of Johannesburg, and other Government agencies such as National

Directors:

Ms Gugulethu Phakathi (Chairperson), Mr Ntshavheni Mukwevho (Managing Director and Executive Director), Mr Johan Koekemoer (Financial Director and Executive Director), Mr Phetole Modika, Mr Siphamandla Mnyani, Mr Siyabonga Mthembu, Mrs Zandile Meeleso, Mr Pholoso Matjele, Mr Kgaile Mogoye, Mr Molate Mashifane, Ms Pamela Mabece, Mr Lunga Bernard

Ms Kethabile Mabe (Company Secretary),
Johannesburg Water SOC Ltd
Registration Number: 2000/029271/30

Treasury, and the Auditor-General of South Africa. We have agreements in place to ensure that they comply with the privacy requirements as required by the Protection of Personal Information Act.

We may also disclose your information:

- Where we have a duty or a right to disclose in terms of law;
- Where we believe it is necessary to protect our rights.

3.4 Information Security

We are legally obliged to provide adequate protection for the personal information we hold and to stop unauthorised access and use of personal information. We will, on an ongoing basis, continue to review our security controls and related processes to ensure that your personal information remains secure.

When we contract with third parties, we impose appropriate security, privacy and confidentiality obligations on them to ensure that personal information that we remain responsible for, is kept secure. We will ensure that anyone whom we pass your personal information agrees to treat your information with the same level of protection as we are obliged to.

3.5 Your rights: Access to Information

You have the right to request a copy of the personal information we hold about you. To do this, simply contact us at informationofficer@jwater.co.za, and specify what information you require.

3.6 Correction of your personal information

You have the right to ask us to update, correct or delete your personal information. We will require a copy of your identification document to confirm your identity before making changes to personal information we may hold about you. We would appreciate it if you would keep your personal information accurate and up to date.

Directors:

Ms Gugulethu Phakathi (Chairperson), Mr Ntshavheni Mukwevho (Managing Director and Executive Director), Mr Johan Koekemoer (Financial Director and Executive Director), Mr Phetole Modika, Mr Siphamandla Mnyani, Mr Siyabonga Mthembu, Mrs Zandile Meeleso, Mr Pholoso Matjele, Mr Kgaile Mogoye, Mr Molate Mashifane, Ms Pamela Mabece, Mr Lunga Bernard

Ms Kethabile Mabe (Company Secretary),
Johannesburg Water SOC Ltd
Registration Number: 2000/029271/30

City of Johannesburg

Johannesburg Water SOC Ltd

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PO Box 61542
Marshalltown
2107

Tel +27(0) 11 688 1400
Fax +27(0) 11 688 1528

www.johannesburgwater.co.za

3.7 How to contact us

If you have any queries about this document; you need further information about our privacy practices; wish to withdraw consent; exercise preferences or access or correct your personal information, please contact us at the numbers listed on our website or send an email to informationofficer@jwater.co.za.

Name of authorised person:.....

Signature:.....

Date:.....

Directors:

Ms Gugulethu Phakathi (Chairperson), Mr Ntshavheni Mukwevho (Managing Director and Executive Director), Mr Johan Koekemoer (Financial Director and Executive Director), Mr Phetole Modika, Mr Siphamandla Mnyani, Mr Siyabonga Mthembu, Mrs Zandile Meeleso, Mr Pholoso Matjele, Mr Kgaile Mogoye, Mr Molate Mashifane, Ms Pamela Mabece, Mr Lunga Bernard

Ms Kethabile Mabe (Company Secretary),
Johannesburg Water SOC Ltd
Registration Number: 2000/029271/30

CONSENT TO PROCESS PERSONAL INFORMATION IN TERMS OF THE PROTECTION OF PERSONAL INFORMATION ACT, NO. 4 OF 2013 (POPIA)

The purpose of the Protection of Personal Information Act, no. 4 of 2013 (POPIA), is to protect personal information of individuals and businesses and to give effect to their right of privacy as provided for in the Constitution. By signing this form, you consent to lawful collection, processing, storage and, where necessary, sharing your personal information by Johannesburg Water SOC Ltd. and consent is effective immediately and will remain effective until such consent is withdrawn in terms of POPIA.

1. I …… a natural person "herein referred to as the Data Subject" with ID Number …… hereby give my consent to Johannesburg Water SOC Ltd. "herein referred to as the Responsible Party" to collect, process and distribute my personal information where Johannesburg Water SOC Ltd. is legally required to do so.

2. I understand my right to privacy and the right to have my personal information processed in accordance with the conditions for the lawful processing of personal information.

3. I understand the purposes for which my personal information is required and for which it will be used and consent to third parties accessing my personal information and to Johannesburg Water SOC Ltd. sharing my personal information strictly for reporting purposes.

4. I understand that, should I refuse to provide Johannesburg Water SOC Ltd. with the required consent and/or information, Johannesburg Water SOC Ltd. will be unable to assist me.

5. I declare that all my personal information supplied to Johannesburg Water SOC Ltd. is accurate, up to date, not misleading and that it is complete in all respects and that I will notify Johannesburg Water SOC Ltd. of any changes to my Personal Information should any of these details change.

6. I also understand that I have the right to request that my personal information be corrected or deleted, if it is inaccurate, irrelevant, excessive, out of date, incomplete, misleading, or obtained unlawfully or that the personal information or record be destroyed or deleted if the Responsible Party is no longer authorised to retain it.

Signed at ..... this ..... day of .....20……

…..
Signature of data subject/designated person

……	……	……
Full Name/Dept of Responsible Party	Signature	Date

JOHANNESBURG WATER

DATA SUBJECT CONSENT WITHDRAWAL FORM
IN TERMS OF THE PROTECTION OF PERSONAL INFORMATION ACT, NO. 4 OF 2013 (POPIA)

CONSENT

I ……. a natural person "herein referred to as the "Data Subject" with identification number …….. hereby withdraw my consent to process my personal information by Johannesburg Water SOC Ltd (Responsible Party). Therefore, Johannesburg Water SOC Ltd. no longer has my consent to process my personal information for the intended purpose

……
……
……..
which was previously granted using the DATA SUBJECT CONSENT FORM.

The withdrawal of consent does not affect the lawfulness of the processing activities up to the date on this form.

Details of Data Subject

Name and surname: ……..
Identification number: ……..
Date of Birth: ……..
Residential address: ……..
……..
……..
Contact number(s): ……..
E-mail address: ……..
Relationship to Responsible Party: ……..

Signed at _____ on this _____ day of _____ 20 __

_____
Signature of Data Subject

_____
Information Officer/Deputy
Johannesburg Water SOC Ltd.

JOHANNESBURG WATER

Johannesburg Water (SOC) Ltd

CONTRACT NO: JW14508

MAYFAIR WATER PIPE REPLACEMENT

VOLUME 1

PART 1: TENDERING PROCEDURES

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T1.1.2 Tender Data 3

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.

Clause Number	Tender Data
C.1.1	The Employer is, Johannesburg Water (SOC) Limited
C.1.2	The tender document 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

Clause Number	Tender Data
	Contract Part 2: Pricing Data C2.1: Pricing Instructions C2.2: Bill of Quantities **Volume 2A** **Contract Part 3: Scope of Work** C3.1: Scope of Work C3.2: Particular Specifications **Contract Part 4: Site Information** C4: Site Information **Volume 2B** Generic Specifications **Volume 3** Occupational Health, Safety and Environmental Specification Environmental Management Plan **Volume 4** Tender Drawings
C.1.4	The Employer's representative is: Contact Person: Nosipho Phakathi Telephone: 011 688 1921 E-mail address: nosipho.phakathi@jwater.co.za The SCM representative is: Contact Person: Gcina Ndela Telephone: 011 688 1796 E-mail address: Gcina.ndela@jwater.co.za

Clause Number	Tender Data
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 the contractor grading designation determined in accordance with the sum tendered for an 8CE class of construction work, are eligible to submit tenders. Tenders must have an Active status at the required CIDB gradings 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: i) every member of the joint venture is registered with the CIDB; and ii) 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 8CE class of construction work as defined on the table below. **Failure to meet to Eligibility criteria and requirements will result in disqualification.**
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 and clause C.2.15.1"
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."

Clause Number	Tender Data
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: a) 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. b) 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: a) 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. b) 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. c) 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: a) (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.2.13.2	Tenderers who fail to complete and sign the Form of Offer will be eliminated.
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)

Clause Number	Tender Data
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: **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 90 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: 1) Valid SARS Compliance status Pin for Tenders issued by the South African Revenue Services. 2) Proof of CSD registration i.e. MA number 3) A Certificate of Contractor Registration issued by the CIDB. 4) where the tendered amount inclusive of VAT exceeds R 10 million: i. 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.

Clause Number	Tender Data
	ii. 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. 5) 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 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. 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.**

Clause Number	Tender Data
	Accept that: i) 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. ii) 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** 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

Clause Number	Tender Data
	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."
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
C.3.9	Replace Existing Clause Arithmetic Errors **Construction related tenders**

Clause Number	Tender Data
	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: (i) Check the amount in words against the amount in figures on the *Form of Offer*, (ii) Check the Form of Offer against the Summary Schedule Total, (iii) Check the Section Sub-Totals per section against the Summary Total for summation errors, (iv) Check the Section Sub-Totals in the Summary Schedule against Section Sub-Totals in the Bill of Quantities. (v) Check the Section Sub-Totals against the Item Totals for summation errors. (vi) 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: (i) 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: (i) 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. (ii) 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. (i) In the event that the Tenderer accepts identified corrections, JW will proceed with evaluation.

Clause Number	Tender Data
	(ii) 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. 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.

Stage	Description
Stage 1	Mandatory Evaluation
Stage 2	Administrative Evaluation
Stage 3	Technical Evaluation
Followed by	Specific Goals and Pricing Evaluation

Stage 1: Mandatory Evaluation

Description		Complied	
No	Description	Yes	No
1	CIDB grading 8CE or higher. Active Status at the required CIDB grading at the time of Evaluation		
2	Attendance of Mandatory Tender Briefing Meeting		
3	Form of Offer Completed and Signed		
4	**Financial Capacity**: Submit not older than 30 days Bank-stamped bank statements (only the page that shows the balance), bank-stamped overdraft facilities and bank-stamped bank confirmation letter. For this requirement, contractors are required to demonstrate to have a minimum of 10% of the amount indicated in the form of offer excluding VAT and contingencies. Failure to comply with this requirement will be deemed as non-compliance by the contractor and will be disqualified immediately.		

Tenderers who **FAIL** to meet the mandatory criteria or requirements of tender will result in disqualification.

Clause No.	Tender Data

Stage 2: Administrative Evaluation

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		
MBD 1	Invitation to Bid	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 signed MBD 4 Form		
MBD 5	Declaration for procurement above 10 million (all applicable taxes included)	Complete and submit signed MBD 5 Form		
MBD 6.1	Preference Points Claim in Terms of The Preferential Procurement Regulations 2022	Complete and submit signed MBD 6.1 Form		
MBD 8	Declaration of bidder's past supply chain management practices	Complete and submit signed MBD 8 Form		
MBD 9	Certificate of Independent Bid Determination	Complete and submit signed MBD 9 Form		
Annexure – Proof of Specific Goals	Valid BBBEE Certificate issued by SANAS accredited verification agency showing percentage of ownership and share certificate where applicable	Submit applicable documentation with the tender submission		

Employer:		**Contractor:**	
Witness:		**Witness:**	

Clause No.	Tender Data

Annexure – Proof of Specific Goals	Proof of municipal account / valid lease agreement, letter from the Ward Council confirming the business address	Submit applicable documentation with the tender submission		
Annexure T2.2.4	Municipal statement of account for tendering entity (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 T2.2.4	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	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 if applicable	Submit applicable documentation with the tender submission		
T 2.3.2	Acknowledgement of Tender Drawings	Complete and submit signed T 2.3.2 Form		
T 2.3.1	Returnable Annexure A: Acknowledgement of SHE Specification & Annexures	Complete and submit signed T 2.3.1 Form		
T2.1.1	Record of Addenda to Tender Documents	Complete and submit complete and signed 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.

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:**	

Clause No.	Tender Data

Stage 3: Technical Evaluation

The following aspect will be considered during the Technical Evaluation:

Criteria No #	Criteria	Evidence	Sub-Criteria/Clause		Max Score	Score
1.	Tenderers' Experience with Respect to Water Pipe Laying (reticulation or bulk pipe laying) projects with a minimum construction value of R30M (Incl VAT) per project.	Record of completed projects accompanied with Contractor letter of appointment, completion certificate / final approval certificate and supported with contactable references in section T2.1.7. ***If the completed project was subcontracted, the following is required:*** ***1. Main Contractor's letter of appointment*** ***2. Main Contractor's completion/final approval certificate***	**NUMBER OF COMPLETED WATER PIPE LAYING (RETICULATION OR BULK PIPE LAYING) PROJECTS WITH A MINIMUM CONSTRUCTION VALUE OF 30 MILLION RAND (INCL VAT) PER PROJECT**	No submission, 0 (zero) completed projects or project(s) completed have a value less than R30 million each	100	0
				1 (one) completed project with a value of a minimum of R30 million each but less than R60 million		25
				2 (two) completed projects with a value of a minimum of R30 million each **OR** 1 (one) completed project with a minimum of R60 million		50

Employer:		Contractor:	
Witness:		Witness:	

Clause No.	Tender Data

		3. *Subcontractor's letter of appointment* 4. *Subcontractor's completion/final approval certificate* 5. *Reference letter provided by the Main Contractor*		3 (three) completed projects with a minimum value of R30 million each **OR** 2 (two) completed projects with a minimum of R30 million each, with a cumulative value of a minimum of R90 million		75
				4 (four) or more projects completed with a minimum of R30 million each **OR** 3 (three) or more completed projects with a minimum of R30 million each, with cumulative value of a minimum of R120 million		100
				MINIMUM QUALIFYING SCORE		**75**
				TOTAL		**100**

Tenderers who FAIL to meet the technical criteria or requirements (75 minimum Score) of tender will be disqualified.

Employer:		**Contractor:**	
Witness:		**Witness:**	

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 PREFERRENCE POINTS SCORING SYSTEM** The following preference point systems are applicable to all bids: - 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 values of this bid is estimated to be above R50 000 000 (all applicable taxes included) and therefore the 90/10 preference point system shall be applicable respectively. (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: Rand value above R50 000 000 (all applicable taxes included). (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.

Description	Points
Price	90
Specific goals	10
Total points for Price and Specific Goals must not exceed	**100**

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 must 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:** I. 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:** I. 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:** 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.

Clause number	Tender Data
	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 sub-contracting a Historically Disadvantaged Individuals (HDI) company. 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 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.

Clause number	Tender Data

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:

The specific goals allocated points in terms of this tender	Number of points allocated (90/10 system)	
Business owned by 51% or more black people who are youth	4	
Locality (businesses within boundaries of Gauteng	3	
Business owned by 51% or more-Women	3	
Total	**10**	

The following verification documents must be submitted with the tender document:

Specific Goals – any one or a combination of any	Means of verification that may be selected or a combination thereof
Businesses located within the boundaries of Gauteng	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
Business owned by 51% or more - black people who are youth	Valid Construction Sector BBBEE Certificate issued by SANAS accredited verification agency
Business owned by 51% or more-Women	Valid Construction Sector BBBEE Certificate issued by SANAS accredited verification agency or Affidavit sworn under oath, OR CIPC registration document showing percentage of ownership and share certificate where applicable

Note: The joint venture, consortium, or equivalent agreement in order for JW to determine the proportional points for specific goals.

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 Gauteng Province and one is located in Free State, if one of the goals is locality and has total points of 3, the JV will only be entitled the proportional points of 1,5.

Clause number	Tender Data

The following are the requirements for a valid Sworn Affidavit in 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
> 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

Clause number	Tender Data
	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 are as follows:** a) Copy of a certified valid BBBEE certificate (Only Valid BBBEE accredited by SANAS), or a valid Sworn Affidavit in a format complying with commissioner of oath Act. b) Bidders who do NOT qualify as EME's and QSE's as outlined above 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 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 indicated above will not be disqualified but will be allocated zero points for specific goals and will be allocated points for pricing. **2. ADJUDICATION USING A POINT SYSTEM** a) The bidder obtaining the highest number of total points will be awarded the contract.

Clause number	Tender Data
	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. **3. POINTS AWARDED FOR PRICE THE 80/20 PREFERENCE POINT SYSTEMS** **POINTS AWARDED FOR PRICE THE 90/10 PREFERENCE POINT SYSTEMS** A maximum of 90 points is allocated for price on the following basis: **90/10** $Ps = 90\left(1 - \frac{Pt - Pmin}{Pmin}\right)$ Where Ps = Points scored for comparative price of bid under consideration Pt = Comparative price of bid under consideration Pmin = 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 will provide the necessary insurance cover, the Employer will require under the contract."

Clause number	Tender Data
C.3.13.1	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 Demand 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; 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;
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 ---

Johannesburg Water SOC Ltd

CONTRACT NO: JW14508

MAYFAIR WATER PIPE REPLACEMENT

VOLUME 1

RETURNABLE DOCUMENTS AND SCHEDULES

The tenderer must complete the following returnable documents:

T2.1 LIST OF RETURNABLE DOCUMENTS

Returnable Schedules required for tender evaluation purposes

Document		Page No.
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.10
T2.1.4	Preferential Procurement	RD.13
MBD 6.1	Preference Points Claim Form in Terms of the Preferential Procurement Regulations 2022	RD.14
MBD 4	DECLARATION OF INTEREST	RD.21
MBD 8	DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES	RD.24
MBD 5	DECLARATION FOR PROCUREMENT ABOVE R10 MILLION (VAT INCLUDED)	RD.26
		RD.29
MBD 9	CERTIFICATE OF INDEPENDENT BID DETERMINATION	
T2.1.5	Proposed Amendments and Qualifications	RD.32
T2.1.6	Schedule of the Tenderer's Experience	RD.33
T2.1.7	Contactable Reference -	RD.34

T2.2 LIST OF OTHER RETURNABLE DOCUMENTS

Other documents required only for tender evaluation purposes

Document		Page No.
T2.2.1	Contractor's Certificate of Registration With CIDB	RD.43
T2.2.2	SARS Tax Compliance Status Pin and Proof of CSD registration	RD.44

T2.3 LIST OF RETURNABLE SCHEDULES

Other documents that will be incorporated into the contract

Document		Page No.
T2.3.1	Returnable Annexure A: Acknowledgement of SHE Specification &	RD.46
T2.3.2	Returnable Annexure B: Acknowledgment of Tender Drawings	RD.47
T2.3.3	Minutes of the Mandatory Tender Briefing	RD.49

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.*

T2.1 LIST OF RETURNABLE DOCUMENTS

Returnable Schedules required for tender evaluation purposes:

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T2.1.6	Schedule of the Tenderer's Experience	RD.33
T2.1.7	Contactable Reference -	RD.34

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: .....

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 CORPORATION	(III) PARTNERSHIP	(IV) JOINT VENTURE	(V) SOLE PROPRIETOR

(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. JW14508 and any contract resulting from it on behalf of the company.

Chairman: .....

As Witnesses: 1 .....

2 .....

Date: .....

(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.

(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.

(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.

(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: .....

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
- ☐ a member of any provincial legislature
- ☐ a member of the National Assembly or the National Council of Province
- ☐ a member of the board of directors of any municipal entity
- ☐ an official of any municipality or municipal entity
- ☐ 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 an accounting authority of any national or provincial public entity
- ☐ an employee of Parliament or a provincial legislature

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

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
- ☐ a member of any provincial legislature
- ☐ a member of the National Assembly or the National Council of Province
- ☐ a member of the board of directors of any municipal entity
- ☐ an official of any municipality or municipal entity
- ☐ 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 an accounting authority of any national or provincial public entity
- ☐ an employee of Parliament or a provincial legislature

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:

i) authorizes the Employer to verify the tax compliance status from the South African Revenue Services that my / our tax matters are in order.

ii) confirms that the neither the name of the enterprise or the name of any partner, manager, director or other person, who wholly or partly exercises, or may exercise, control over the enterprise appears on the Register of Tender Defaulters established in terms of the Prevention and Combating of Corrupt Activities Act of 2004.

iii) confirms that no partner, member, director, or other person, who wholly or partly exercises, or may exercise, control over the enterprise appears, has within the last five years been convicted of fraud or corruption.

iv) iv) confirms that I / we are not associated, linked, or involved with any other tendering entities submitting tender offers and have no other relationship with any of the tenderers or those responsible for compiling the scope of work that could cause or be interpreted as a conflict of interest; and

v) iv) 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

Forms for Completion by the Tenderer included in this section are:

Form No.	Form Title	Description	Page No.
MBD 6.1	Preference Points Claim Form in Terms of the Preferential Procurement Regulations 2022	Procedures and adjudication criteria for the information of the Tenderer	RD.14
MBD 4	DECLARATION OF INTEREST	Form to be completed by the Tenderer	RD.21
MBD 8	DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES	Form to be completed by the Tenderer	RD.24
MBD 5	DECLARATION FOR PROCUREMENT ABOVE R10 MILLION (VAT INCLUDED)	Form to be completed by the Tenderer	RD.26
MBD 9	CERTIFICATE OF INDEPENDENT BID DETERMINATION	Form to be completed by the Tenderer	RD.29

Note: All information supplied must be current and valid. Proposed or imminent changes to a Tenderer's status may be mentioned but the declarations must reflect current circumstances.

MBD 6.1

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

1.2 To be completed by the organ of state

a) 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.

1.4 To be completed by the organ of state:

The maximum points for this tender are allocated as follows:

the 90/10 system for requirements with a Rand value above R50 000 000 (all applicable taxes included)

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

1.5 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.

1.6 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.

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:

$$Ps = 90\left(1 - \frac{Pt - P\,min}{P\,min}\right)$$ **90/10**

Where

Ps = Points scored for price of tender under consideration

Pt = Price of tender under consideration

Pmin = Price of lowest acceptable tender

4. FORMULAE FOR DISPOSAL OR LEASING OF STATE ASSETS AND INCOME GENERATING PROCUREMENT

4.1 POINTS AWARDED FOR PRICE

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

$$Ps = 90\left(1 + \frac{Pt - P\,max}{Pmax}\right)$$ **90/10**

Where

Ps = Points scored for price of tender under consideration

Pt = Price of tender under consideration

Pmax = Price of highest acceptable tender

5. POINTS AWARDED FOR SPECIFIC GOALS

5.1 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:

5.2 In cases where organs of state intend to use Regulation 3(2) of the Regulations, which states that, if it is unclear whether the 80/20 or 90/10 preference point system applies, an organ of state must, in the tender documents, stipulate in the case of—

(a) an invitation for tender for income-generating contracts, that either the 80/20 or 90/10 preference point system will apply and that the highest acceptable tender will be used to determine the applicable preference point system; or

(b) any other invitation for tender, that either the 80/20 or 90/10 preference point system will apply and that the lowest acceptable tender will be used to determine the applicable preference point system,

then the organ of state must indicate the points allocated for specific goals for both the 90/10 and 80/20 preference point system.

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.)

For 90/10 Preference Point Systems

The specific goals allocated points in terms of this tender	Number of points allocated (90/10 system)
Business owned by 51% or more black people who are youth	4
Locality (businesses within boundaries of Gauteng	3
Business owned by 51% or more-Women	3
Total	**10**

6. DECLARATION WITH REGARD TO COMPANY/FIRM

6.1 Name of company/firm…….
6.2 Company registration number: ……...
6.3 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]

6.4 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.

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(S)

SURNAME AND NAME: .....

DATE: .....

ADDRESS: .....

.....

.....

.....

6.5 SUB-CONTRACTING

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

(***Tick applicable box***)

YES		NO	

6.5.2 If yes, indicate:

i) What percentage of the contract will be subcontracted_____

ii) The name of the sub-contractor(s):

.....

.....

.....

.....

.....

iii) The black sharehold 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		

6.6 DECLARATION WITH REGARD TO COMPANY/FIRM

6.6.1 Name of company/firm: ……

6.6.2 VAT number registration number: ……

6.6.3 Company registration number: ……

6.7 TYPE OF COMPANY/ FIRM

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

6.8 DESCRIBE PRINCIPAL BUSINESS ACTIVITIES

……

……

……

……

6.9 COMPANY CLASSIFICATION

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

6.10 MUNICIPAL INFORMATION

Municipality where business is situated: ……

Registered Account Number: ……

Stand Number: ……

6.11 Total number of years the company/firm has been in business: ……

6.12 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 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 …….. …….. ……..

MBD 4

DECLARATION OF INTEREST

1. No bid will be accepted from persons in the service of the state[1].

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, hareholder[2]): .....

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. .....

.....

[1]MSCM 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 .....

.....

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 *audi alteram partem* 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

   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**

2.1 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.

2.2 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

.....

.....

CERTIFICATION

I, THE UNDERSIGNED (FULL NAME) …… CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM IS TRUE AND 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 bids[1] 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.**

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 consortium[3] 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:
   (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

[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.**

(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**

PROOF OF GOODSTANDING WITH MUNICIPALITY ACCOUNTS

The tenderer is to affix to this page:

- 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;
- Signed copy of the valid lease agreement if the tenderer or director of the tenderer is currently leasing premises and not responsible for paying municipal accounts

Note:

1. 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.
2. The proof may be a copy of the agreement or an updated municipal statement which reflects the arrangement.
3. 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.
4. Statement must not be older than 90 days from the closing date of this tender. Attach latest municipal account statement behind this page.
5. 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. Note 1 will be applicable.
6. 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. Note 1 will be applicable.

PROOF OF GOODSTANDING WITH MUNICIPALITY ACCOUNTS

7. Where a municipal account submitted for purposes of compliance is in the name of a Trust, the bidder must submit the following documentation in order to establish the relationship between the director and the Trust and to confirm that municipal obligations are in order:

a) Municipal Account

- A valid municipal account issued in the name of the Trust must be submitted.
- The municipal account must not be older than three (3) months from the date of the request.
- The account must not be in arrears, or alternatively, proof must be provided that arrangements have been made with the relevant municipality for payment of overdue amounts.
- Where the director occupies or resides at the property owned by the Trust and a valid lease agreement exists between the Trust and the director, a copy must be submitted as supporting documentation

b) Proof of Trusteeship

- In order to establish the relationship between the director and the Trust, the bidder must submit a Letter of Authority issued by the Master of the High Court, confirming the appointment of the director as a trustee of the Trust.
- The name of the Trust reflected on the Letter of Authority must correspond with the name of the Trust appearing on the municipal account submitted.

c) Affidavit by the Director

- The director concerned must submit a sworn affidavit confirming that:

- The property reflected on the municipal account is owned by the Trust;
- The director is a duly appointed trustee of the Trust;
- The director resides at, occupies, or has a direct interest in the property reflected on the municipal account; and
- The municipal account submitted is the only applicable municipal account relating to the director's municipal obligations.

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: .....

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: .....

Tenderer: .....

T2.1.7 CONTACTABLE REFERENCE

To Johannesburg Water (SOC) Ltd

I, the undersigned being duly authorised to do so, hereby furnish a reference to Johannesburg Water relative to tender Contract No**. JW14508 – MAYFAIR WATER PIPE REPLACEMENT**

Name of Tenderer: ……..

Name of the Project	
Select the Applicable Scope of Pipe Laying **Reticulation** ☐ **Bulk Pipe** ☐ **Other** ☐ **If Other, provide details:** _____ _____	
Project value in Rands (Incl VAT)	

Name of Client Company …….

Name of Main Client Company (Employer if different from name of Client company) …….

Was Project a Sub-Contract……Yes/No

Name of authorized person/Referee completing this Letter……..

Signature of authorized person/Referee: ……..……Date ……..……...

Telephone/Mobile of authorized person/Referee: ……

Email address of authorized person/Referee: ……..

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. ***For Main Contractor please submit the Reference Form, Letter of Appointment and Completion Certificate or Final Approval Certificate. If the completed project was a subcontract, Reference letter must be accompanied by Main Contractor's Letter of Appointment, Main Contractor's Completion or Final Approval Certificate, Subcontractor's letter of appointment and the Subcontractor's Completion or Final Approval Certificate.***

By submitting a Tender, the Tenderer expressly warrants that all information provided is accurate, complete, and not misleading. The JW reserves the right to reject a Tender, disqualify a Tenderer, or pursue blacklisting and other punitive measures as per relevant regulations, should any information be found to be false, misrepresented, or unsubstantiated upon verification, including through the process described in the evaluation criteria.

T2.1.7 CONTACTABLE REFERENCE

To Johannesburg Water (SOC) Ltd

I, the undersigned being duly authorised to do so, hereby furnish a reference to Johannesburg Water relative to tender Contract No**. JW14508 – MAYFAIR WATER PIPE REPLACEMENT**

Name of Tenderer: ……..

Name of the Project	
Select the Applicable Scope of Pipe Laying **Reticulation** ☐ **Bulk Pipe** ☐ **Other** ☐ **If Other, provide details:**	
Project value in Rands (Incl VAT)	

Name of Client Company …….

Name of Main Client Company (Employer if different from name of Client company) …….

Was Project a Sub-Contract……Yes/No

Name of authorized person/Referee completing this Letter……..

Signature of authorized person/Referee: ……..……Date ……...

Telephone/Mobile of authorized person/Referee: ……

Email address of authorized person/Referee: ……..

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.* ***For Main Contractor please submit the Reference Form, Letter of Appointment and Completion Certificate or Final Approval***

Certificate. If the completed project was a subcontract, Reference letter must be accompanied by Main Contractor's Letter of Appointment, Main Contractor's Completion or Final Approval Certificate, Subcontractor's letter of appointment and the Subcontractor's Completion or Final Approval Certificate.

By submitting a Tender, the Tenderer expressly warrants that all information provided is accurate, complete, and not misleading. The JW reserves the right to reject a Tender, disqualify a Tenderer, or pursue blacklisting and other punitive measures as per relevant regulations, should any information be found to be false, misrepresented, or unsubstantiated upon verification, including through the process described in the evaluation criteria.

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To Johannesburg Water (SOC) Ltd

I, the undersigned being duly authorised to do so, hereby furnish a reference to Johannesburg Water relative to tender Contract No**. JW14508 – MAYFAIR WATER PIPE REPLACEMENT**

Name of Tenderer: ……..

Name of the Project	
Select the Applicable Scope of Pipe Laying **Reticulation** ☐ **Bulk Pipe** ☐ **Other** ☐ **If Other, provide details:**	
Project value in Rands (Incl VAT)	

Name of Client Company …….

Name of Main Client Company (Employer if different from name of Client company) …….

Was Project a Sub-Contract……Yes/No

Name of authorized person/Referee completing this Letter……..

Signature of authorized person/Referee: ……..……Date ……...

Telephone/Mobile of authorized person/Referee: ……

Email address of authorized person/Referee: ……..

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.* ***For Main Contractor please submit the Reference Form, Letter of Appointment and Completion Certificate or Final Approval***

Certificate. If the completed project was a subcontract, Reference letter must be accompanied by Main Contractor's Letter of Appointment, Main Contractor's Completion or Final Approval Certificate, Subcontractor's letter of appointment and the Subcontractor's Completion or Final Approval Certificate.

By submitting a Tender, the Tenderer expressly warrants that all information provided is accurate, complete, and not misleading. The JW reserves the right to reject a Tender, disqualify a Tenderer, or pursue blacklisting and other punitive measures as per relevant regulations, should any information be found to be false, misrepresented, or unsubstantiated upon verification, including through the process described in the evaluation criteria.

T2.1.7 CONTACTABLE REFERENCE

To Johannesburg Water (SOC) Ltd

I, the undersigned being duly authorised to do so, hereby furnish a reference to Johannesburg Water relative to tender Contract No**. JW14508 – MAYFAIR WATER PIPE REPLACEMENT**

Name of Tenderer: ……..

Name of the Project	
Select the Applicable Scope of Pipe Laying **Reticulation** ☐ **Bulk Pipe** ☐ **Other** ☐ **If Other, provide details:**	
Project value in Rands (Incl VAT)	

Name of Client Company …….

Name of Main Client Company (Employer if different from name of Client company) …….

Was Project a Sub-Contract……Yes/No

Name of authorized person/Referee completing this Letter……..

Signature of authorized person/Referee: ……..……Date ……...

Telephone/Mobile of authorized person/Referee: ……

Email address of authorized person/Referee: ……..

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.* ***For Main Contractor please submit the Reference Form, Letter of Appointment and Completion Certificate or Final Approval***

Certificate. If the completed project was a subcontract, Reference letter must be accompanied by Main Contractor's Letter of Appointment, Main Contractor's Completion or Final Approval Certificate, Subcontractor's letter of appointment and the Subcontractor's Completion or Final Approval Certificate.

By submitting a Tender, the Tenderer expressly warrants that all information provided is accurate, complete, and not misleading. The JW reserves the right to reject a Tender, disqualify a Tenderer, or pursue blacklisting and other punitive measures as per relevant regulations, should any information be found to be false, misrepresented, or unsubstantiated upon verification, including through the process described in the evaluation criteria.

T2.2 LIST OF RETURNABLE DOCUMENTS

Other documents required only for tender evaluation purposes:

Document		Page No.
T2.2.1	Contractor's Certificate of Registration With CIDB	RD.43
T2.2.2	SARS Tax Compliance Status Pin and Proof of CSD registration	RD.44

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.

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)

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 xxxxxxxxxx number.

SIGNATURE:.....…… DATE: ….....

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

T2.3 LIST OF RETURNABLE SCHEDULES

3. Other documents that will be incorporated into the contract

Document		Page No.
T2.3.1	Returnable Annexure A: Acknowledgement of SHE Specification &	RD.46
T2.3.2	Returnable Annexure B: Acknowledgment of Tender Drawings	RD.47
T2.3.3	Minutes of the Mandatory Tender Briefing	RD.49

T2.3.1 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 3)
- 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*	

*Signature must be as per form T2.1.2 as applicable

T2.3.2 RETURNABLE ANNEXURE B: ACKNOWLEDGMENT 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 as per drawing list:

WBS Code/ ID	Drawing Description	Drawing No.
1	**General layouts**	
1.1	General layouts	JW14508-MAY-WAT-LAY-000
1.2	General layouts Sheet 1 of 8	JW14508-MAY-WAT-LAY-001
1.3	General layouts Sheet 2 of 8	JW14508-MAY-WAT-LAY-002
1.4	General layouts Sheet 3 of 8	JW14508-MAY-WAT-LAY-003
1.5	General layouts Sheet 4 of 8	JW14508-MAY-WAT-LAY-004
1.6	General layouts Sheet 5 of 8	JW14508-MAY-WAT-LAY-005
1.7	General layouts Sheet 6 of 8	JW14508-MAY-WAT-LAY-006
1.8	General layouts Sheet 7 of 8	JW14508-MAY-WAT-LAY-007
1.9	General layouts Sheet 8 of 8	JW14508-MAY-WAT-LAY-008
2	**Standard Details**	
2.1	Bedding detail	JW100-DET02-W01
2.2	Typical valve box	JW100-DET03-W01
2.3	Typical scour box	JW100-DET04-W01
2.4	Typical trusut block detail	JW100-DET05-W01
2.5	Fire Hydrant detail	JW100-DET06-W01
2.6	Water hydrant connection	JW100-DET07-W01
2.7	Metered fire connection	JW100-DET08-W01
2.8	Above ground water meter	JW100-DET09-W01
2.9	Pressure reduce valve chamber details	JW100-DET10-W01

WBS Code/ ID	Drawing Description	Drawing No.
2.10	Typical bulk flow meter detail	JW100-DET11-W01
2.11	Detail of service marker	JW100-DET12-W01

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

Name of tenderer	
Name of Authorized person	
Authorized Signature*	

*Signature must be as per form T2.1.2 as applicable

T2.3.3 MINUTES OF THE MANDATORY TENDER BRIEFING MEETING

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.		Minutes of the Mandatory Tender Briefing Meeting

Attach additional pages if more space is required.

Signed: ..... Date: .....

Name: ..... Position: .....

Tenderer: .....

Johannesburg Water (SOC) Ltd

CONTRACT: JW14508

MAYFAIR WATER PIPE REPLACEMENT

VOLUME 1

PART 1: AGREEMENT AND CONTRACT DATA

Employer:		Contractor:	
Witness:		Witness:	

TABLE OF CONTENTS

		Page No.
C1.1	**Form of Offer (Acceptance & Agreement)**	**C.3**
C1.1.1	Form of Offer	C.3
C1.1.2	Form of Acceptance	C.4
C1.1.3	Schedule of Deviations	C.5
C1.2	**Contract**	**C.7**
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C1.3	**FORMS AND SECURITIES**	**C.29**
C1.3.1	Form of Guarantee	C.32
C1.3.2	Blasting Indemnity	C.33
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	C.35
C1.3.4	Health and Safety Contract: General Information	C.36

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:

JW14508: Mayfair Water Pipe Replacement

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)

Date _____

Employer:		**Contractor:**	
Witness:		**Witness:**	

1.1.2 Form of Acceptance for**:**

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 and signature of Employer

(Name) (Signature)

Capacity

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

Employer:		**Contractor:**	
Witness:		**Witness:**	

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	
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

Employer:		**Contractor:**	
Witness:		**Witness:**	

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**
(Name and address of organisation)

Name and signature of witness _____ _____
(Name) (Signature)

Date _____

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 16 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 Nosipho Phakathi
1.1.1.16	The name of the Employer's Agent is: Polite Mogolola Employed by: Johannesburg Water Engineering Services Unit Turbine Hall 65 Ntemi Piliso Street Newtown Johannesburg
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 1921 Fax: 011 688 1521 Email: nosipho.phakathi@jwater.co.za
1.2.1.2	The address of the Employer's Agent is

<table>
<tr><th>GCC Clause</th><th>Information</th></tr>
<tr><td></td><td>Turbine Hall, 65 Ntemi Piliso Street, Newtown</td></tr>
<tr><td>3.2.3</td><td>Specific Approval – The Employer's Agent is required to obtain the Employer's approval for the following:
Approval of Variation Orders
The use of contingencies
Approval to exceed the Contract Sum
Approval of Subcontracting Plan and Work Packages breakdown
Stoppage/ suspension of Works by Employer's Agent</td></tr>
<tr><td>4.4.2</td><td>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, Johannesburg Water Standard Operations Procedure for SMME appointment (SMME SOP attached ANNEXURE 1)
.</td></tr>
<tr><td>4.10.1</td><td>Add the following to this clause:
The Contractor shall employ non skilled labour from Local Communities (otherwise known as Local Labour), in accordance with the Scope of Work, Site Information, and Specifications.
All Local Labour shall be recruited through the Community Liaison Officer (CLO) and as per requirements of City of Johannesburg Regional Offices. 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.</td></tr>
<tr><td>4.11.1</td><td>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 (see below).
<table>
<tr><th>Competent Employees</th><th>Qualifications</th><th>Experience</th></tr>
<tr><td>Contracts Manager</td><td>Minimum Qualifications of Contract Manager

Only Contract Managers with qualifications of BTech/ BSc/ BEng: (Civil) or Quantity Surveying, Construction Management
AND
Professional Registration (Pr. Eng. / Pr. Technologist, PrCPM/PrCM) will obtain a score for experience of a Contract Manager. However,</td><td>Four completed civil engineering projects as a Contract Manager.</td></tr>
</table></td></tr>
</table>

GCC Clause	Information			
		the date of registration of Contract Manager will not impact post qualification number of projects		
	Construction Manager	Minimum Qualifications of **Construction Manager** Only Construction Managers with qualifications of National Diploma (Civil Engineering or higher)	3 (three) Pipe Laying (reticulation or bulk pipe laying) completed projects with a minimum value of R30 million each as a Construction Manager OR 2 (two) Pipe Laying (reticulation or bulk pipe laying) completed projects with a minimum of R30 million each, with a cumulative value of a minimum of R90 million as a Construction Manager	
	Safety Officer	Post Qualification Experience of **Safety Officer** Only a **Safety Officer** Registered with SACPCMP as a Construction Health and Safety Officer or Construction Health and Safety Manager or Professional Construction Health and Safety Agent.	Three Completed Civil Engineering Projects as a Safety Officer	

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) • Performance Guarantee from Bank or Insurance Company which is registered as a Financial Service Provider (Clause 6.2) • Insurance of the Works, Plant, etc. (Clause 8.6), including but not limited to: o SASRIA Policy o Liability Insurance o Insurance of Construction Machinery and Plant o Contractor's all Risk Insurance o Insurance of Motor Vehicle Liability, o Any other insurance to be submitted by the Contractor • Compliance Certificate in respect of COID • Signed Notification to the Department of Labour • Construction Permit. The Employer will require Health and Safety documentation from the Contractor to acquire this permit.. • Subcontract plan / proposal which includes a number of Subcontractors that meet requirements as per conditions of **C1.2.1.2.14** • Organogram of resources - CVs and certified qualifications and registration of competent employees as per conditions of **Clause 4.11.1 above** (Contracts Manager, Construction Manager and Safety officer).
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.
5.8.1	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), Election Day, and the annual "Builder's Break" as defined by SAFCEC on an annual basis.
5.11.1.2	Delete Clause 5.11.1.2
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 R5000.00 per day, whichever is greater.

Employer:		Contractor:	
Witness:		Witness:	

GCC Clause	Information
5.14.1	The requirements for achieving Practical Completion are: • Completion of all prior activities to and including activity on Supply and lay HDPE or mPVC pipeline using an open trench and trenchless technology methods, bed, test, disinfect and backfill. • House connections • Meter installations and changeover • Reinstate the surfaces to their original condition.
5.16.3	The latent defects period is 10 years for Civil 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 including Escalation, which sum excludes VAT.
6.8.2	**The Contract Price Adjustment is Applicable for this Contract.** The rates shall be adjusted by twelve-month year on year CPI index (as published in the monthly bulletin PO141.1 of statistics South Africa) ruling on the 12-month anniversary date of the Commencement of Contract.
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%.
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 dates to be communicated to the Contractor upon award. • 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/valid tax invoice. 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.
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

GCC Clause	Information
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 Sites are located within the boundaries of the Johannesburg City, 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.
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:

GCC Clause	Information
	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 by the Contractor 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.
10.5.1	Dispute resolution shall be resolved by way of ad-hoc Adjudication.
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 R2,000.00 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.
- The penalty value shall be R 10,000.00 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.

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.

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 R7 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

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 assessments and other requirements, as necessary.

The Employer will impose a penalty value of R5 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

Employer:		**Contractor:**	
Witness:		**Witness:**	

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.

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, - 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 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.

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 Performance Guarantee.

C1.2.1.2.14 Special Conditions

The successful Contractor must subcontract a minimum of 20% 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. Local Subcontractors will be sourced from within the Ward/Region where the project will be implemented.

2. The Contractor will identify subcontracting items or tasks that will meet the subcontracting minimum of 20% 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, scope of work to be allocated, cost of the work to be Subcontracted, number of sub-contractors required on the project, 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 20% of the Contract Price, the Contractor shall identify additional works that will be subcontracted to ensure compliance with the minimum subcontracting percentage.
- The Local sub-contracting appointment will be as per Johannesburg Water's Standard Operating Procedures (SOP attached as Annexure) 2 for SMME appointments.

- 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 20% 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 20% 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)
- 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
- 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.

   The Contractor shall avail himself for all stakeholder engagement sessions leading to the appointment of subcontractors.

C1.2.1.2.15 Competent Employees

Please refer to Clause 4.11.1 of the Contract Data

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 of the relevant Operations Depot.

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** 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”

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:

Physical Address:	Postal Address:
Tel:	Fax:
Email	

Clause 6.8.3 The variation in cost of special materials is

Type	Unit	Rate

NOT APPLICABLE

Johannesburg Water (SOC) Ltd

CONTRACT NO: JW14508

MAYFAIR WATER PIPE REPLACEMENT

VOLUME 1

PART 1.3: FORMS AND SECURITIES

Employer:		**Contractor:**	
Witness:		**Witness:**	

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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, Guarantee Corporation or Financial Services Provider is acceptable as Guarantor.

TO BE PRINTED ON THE OFFICIAL LETTERHEAD 0F THE GUARANTOR.

PERFORMANCE GURANTEE

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 Resolutionof 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

Employer:		**Contractor:**	
Witness:		**Witness:**	

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

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.

Employer:		**Contractor:**	
Witness:		**Witness:**	

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).

Signed at **……** for and on behalf of **……..**

Guarantor's signatory (1)

Name: ……

Designation: ……..… ……

Guarantor's signatory (2)

Name: ……..

Designation: ……..……. ……

Employer:		**Contractor:**	
Witness:		**Witness:**	

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 properly 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:**	

2. _____ _____
Name & Surname Signature

Duly authorised to sign on behalf of: _____

Address: _____

_____

Employer:		**Contractor:**	
Witness:		**Witness:**	

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 mandatary") as envisaged by Section 37(2) of the Occupational Health and Safety Act, No. 85, of 1993 as amended.

I _____ representing _____ (mandatary) do hereby acknowledge that _____ (mandatary) 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 mandatary _____

Signature on behalf of Employer _____

Compensation Fund Registration No. of mandatary _____

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

Employer:		**Contractor:**	
Witness:		**Witness:**	

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. 'Mandatary' 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 Aid by the mandatary.

4. All documents attached or referred to in the above agreement from 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 mandatary 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 **JW14508:** MAYFAIR WATER PIPE REPLACEMENT

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:**	

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:**	

Johannesburg Water SOC Ltd

CONTRACT NO: JW14508

MAYFAIR WATER PIPE REPLACEMET

VOLUME 1

PART 2: PRICING DATA

Employer:		Contractor:	
Witness:		Witness:	

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BILL OF QUANTITIES		PD.7

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 the Employer's Agent has confirmed in writing 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.

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)
m2	=	square metre	No.	=	number
m2 pass	=	square metre pass	sum	=	lump sum
ha	=	hectare	MN	=	mega-newton
m3	=	cubic metre	MN.m	=	mega-newton-metre
m3km	=	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 1200.
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 Tender Data.

l) While the Employer has every intent to complete the full scope of works, the Employer reserves the right to reduce the scope of works according to the budget, or to terminate this contract

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.

Employer:		**Contractor:**	
Witness:		**Witness:**	

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.

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 ordered 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.

C2.1.3.3 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.

C2.1.4 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. All Sub-Contractors shall be appointed as per Johannesburg Standard Operating Procedures (SOP) for SMME appointments. 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 (pay when paid by Johannesburg Water does not apply) 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

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.

BILL OF QUANTITIES

JW14508: MAYFAIR WATER PIPE REPLACEMENT

Employer:		Contractor:	
Witness:		Witness:	

Item No.	Payment Clause	Description	Unit	Qty	Rate	Amount
1	**8.3**	**FIXED-CHARGE ITEMS**				
1.1	8.3.1	**Contractual requirements**	Sum	1		
1.1.1	8.3.2	Provision of facilities on site:				
1.1.2	8.3.2.1	1) Facilities for Engineer:				
		a)Engineers Office Type 2 and parking (No.=2)	Sum	1		
		b)Nameboards (No=2)	Sum	1		
		c) Meeting room Type 1	Sum	1		
		d) Latrine facilities	Sum	1		
1.1.3	8.3.2.2	2) Facilities for the Contractor				
		a) Offices and storage sheds	Sum	1		
		b) Ablution and latrine facilities	Sum	1		
		c) Access (see sub-clause 5.8)	Sum	1		
		d) Water supplies, electric power and communications	Sum	1		
		e) Dealing with water	Sum	1		
1.1.4	PSA 8.3.5.2	OHS Act Obligations (Compilation of OHSAct file)	Sum	1		
1.1.5	PSA 8.3.5.3	EMP Obligations	Sum	1		
1.1.6	PSA 8.3.5.1	Issuing of notices to consumers	Sum	1		
1.1.7	8.3.4	Removal of site Establishment	Sum	1		
1.2	8,4	TIME RELATED ITEMS				
1.21	8.4.1	Contractual requirements	month	16		
	8.4.2	Operation and maintainance of facilities on site.				
1.2.3	8.4.2.1	1) Facilities for Engineer:				
		a)Engineers Office Type 2 and parking (No.=2)	month	16		
		b)Nameboards (No=2)	month	16		
		c) Meeting room Type 1	month	16		
		d) Latrine facilities	month	16		
1.2.4	8.4.2.2	2)Facilities for the Contractor:				
		a) Offices and storage sheds	month	16		
		b) Ablution and latrine facilities	month	16		
		c) Access (see sub-clause 5.8)	month	16		
		d) Plant	month	16		
		e) Water supplies, electric power and communications	month	16		
		f) Dealing with water	month	16		
1.2.5	8.4.3	Supervision for the duration of construction	month	16		
1.2.6	8.4.4	Company and head office overhead costs for the duration of the Contract	month	16		
1.2.7	PSA 8.4.6.2	Security Services	month	16		
1.2.8	OHS Spec.	Allow for compliance with all aspects of the OHS specification including:				
1.2.9	PSA 8.4.6.4	Risk assesment	month	16		
1.2.10	PSA 8.4.6.1(1)	Complaince with Health and Safety Plan including Safety Officer Salary	month	16		
1.2.11	8.6	Prime cost items				
		a) Materials used in the execution of dayworks	P/S	1		
		b) Overheads, charges and profit on item 1.4.1(a) above	%	30000		
SUM CARRIED FORWARD						

Item No.	Payment Clause	Description	Unit	Qty	Rate	Amount
1.3	8.8	TEMPORARY WORKS				
1.3.1	8.8.2	Dealing with traffic for the duration of the Contract	Sum	1		
1.3.2	8.8.6	Dealing with water	Sum	1		
1.3.3	8.8.4	Existing services				
	PSA 8.8.4 (a)	a) Supply or hire of specialist equipment for the detection and Scanning of existing services.	P/S	1	R 50 000,00	R 50 000,00
		Profit on item 1.6.4 (a) above	%	50000		
	PSA 8.8.4 (b)	b) Excavation by hand to expose existing services.	m3	200		
1.3.4	PSA 8.5	PROVISIONAL SUMS STATED BY ENGINEER				
		a) Reinstatement of asphalt by JRA	P/S	1	R 2 500 000,00	R 2 500 000,00
		b) Engineer's Equipment and Independent testing	P/S	1	R 50 000,00	R 50 000,00
		c) Temporary protection of existing services	P/S	1	R 30 000,00	R 30 000,00
		d) Community Liaison Officer	P/S	1	R 225 000,00	R 225 000,00
		e) Landscaping and including irrigation system	P/S	1	R 60 000,00	R 60 000,00
		f) Relocation of existing services	P/S	1	R 50 000,00	R 50 000,00
		g) Training of local labour	P/S	1	R 200 000,00	R 200 000,00
		h) Alterations and connection to Municipal services and repair to damaged services where approved by Engineer	P/S	1	R 20 000,00	R 20 000,00
	PSA 8.4.6.5	i) Community Participation Cost	P/S	1	R 100 000,00	R 100 000,00
		j) Investigations as ordered by the Engineer	P/S	1	R 20 000,00	R 20 000,00
		k) Survey as per the Engineer's instruction. Rate to include for a CD with AutoCAD drawing/s and co-ordinates data in CSV or text format.	P/S	1	R 50 000,00	R 50 000,00
		l) Reinstatement of existing outer buildings to its original state or to Engineer satisifactionrvey as per the Engineer's instruction.	P/S	1	R 100 000,00	R 100 000,00
		m) Overheads, charges and profit on items (a-l) above	%	3405000		
	P.S 3.2.8	n) Overheads, charges and profit on Management fees for SMMEs based on SMME value paid to them (Value of Provisional Sum provided is indicative and will depend on a work package allocation)	%	R 18 852 344,40		
1.4	8.7	Day works (to be executed on instruction from the Engineer)				
1.4.1		Labour				
		a) Unskilled	hr	8		
		b) Semi skilled	hr	8		
		c) Skilled	hr	8		
		d) Armed Security guard	hr	8		
1.4.2		Tipper truck				
		a) Capacity 6m³ (small)	hr	8		
		b) Capacity 10m³ (medium)	hr	8		
		c) Capacity 12m³ (large)	hr	8		
1.4.3		Flat bed tracks				
		a) Capacity 3 ton (small)	hr	8		
		b) Capacity 5 ton (medium)	hr	8		
		c) Capacity 10 ton (large)	hr	8		
1.4.4		LDV's				
		a) Capacity 1 ton	hr	8		
		Conservancy/ Water tankers		8		
		b) Capacity 6,000 litres (small)	hr	8		
		c) Capacity 9,000 litres (medium)	hr	8		
		d) Capacity 15,000 litres (large)	hr	8		
1.4.5		Excavator (Crawler excavator)				
		a) 20 tonne	hr	8		
		b) 30 tonne	hr	8		
1.4.6		TLB's (Tractor loader backhoe)				
		a) 2x4	hr	8		
		b) 4x4	hr	8		
1.4.7		Walk behind vibrating rollers				
		a) Model BW 61 (small)	hr	8		
		b) Model BW 76 (medium)	hr	8		
		c) Model BW 90 (large)	hr	8		
1.4.8		**Compactors**				
		a) Plate compactor	hr	8		
		Compressors (Potable Diesiel Compressor)				
		a) Small	hr	8		
		b) Medium	hr	8		
		c) Large	hr	8		
SUM CARRIED FORWARD						

Item No.	Payment Clause	Description	Unit	Qty	Rate	Amount
1.4.9		**Portable water pumps**				
		a) Small	hr	8		
		b) Medium	hr	8		
		c) Large	hr	8		
CARRIED TO SUMMARY: PRELIMINARY AND GENERAL						

Item No.	Payment Clause	Description	Unit	Qty	Rate	Amount
2	**SANS 1200C**	**SCHEDULE 2: SITE CLEARANCE**				
2.1	8.2.1	Clear and grub for width of 2 metres along the pipe route	m	7850		
2.2	8.2.2	Remove and grub large trees and tree stumps of girth				
		a) over 1m and up to and including 2m	**No.**	50		
		b) over 2m and up to and including 3m	No.	30		
		c) over 3m and up to and including 4m	**No.**	20		
2.3	PSC 8.2.5	Take down existing masonry walls, palisade fences and other obstructions on the pipe route				
		a)110mm wall	m²	300		
		b) 220mm wall	**m²**	300		
		c) 330mm wall	m²	250		
		d) Steel pallisade fences	**m²**	400		
		e) Concrete pallisade fences	m²	20		
2.4	8.2.10	Remove topsoil to nominal depth of 150mm and stockpile	m³	3825		
2.5	PSC 8.2.11b	Removal of man-made surfaces				
		a) Roadway, Asphalt and other layers				
		i) Asphalt (≤ 50mm thick) and including base, sub-base and subgrades layers up to 800mm deep	m²	4000		
		ii) Asphalt (> 50mm ≤ 100mm thick) and including	m²	1800		
		b) Footways and Driveways				
		i) Asphalt ≤ 50mm thickness	m²	7951		
		ii) Asphalt > 50 ≤ 100mm thickness	m²	1705		
		iii) Interlocking concrete segmental paving blocks (all colours)	m²	5936		
		iv) Concrete slabs (450 x 450mm)	m²	389		
		v)Brick paving	m²	1391		
		vi)Unreinforced concrete ≤ 75mm thick	m²	300		
		vii)Reinforced concrete ≤ 75mm thick	m²	199		
		viii)Grassing	m²	1590		
		ix)Kerbing (all types of kerbing)	m	380		
2.6	PSC 8.2.12.1	Backfilling and reinstatement of roads				
		(a) 150mm base	m³	870		
		(b) 150mm subbase	m³	870		
		(c)150mm selected subgrade	m³	870		
SUM CARRIED FORWARD						

Item No.	Payment Clause	Description	Unit	Qty	Rate	Amount
2.5	PSC 8.2.12.2	Backfilling and reinstatement of footways				
		a)Using removed materials:				
		i)Interlocking concrete segmental paving blocks (all colours)	m²	5963		
		ii)Brick paving	**m²**	389		
		iii) Grassing	**m²**	1391		
		iv)Kerbing (all types of kerbing)	m	380		
		b) Using new material				
		i) ≤50mm thick Bitumen hot - mix: Fine	m²	7951		
		ii) >50mm≤100mm thick Bitumen hot - mix: Fine	m²	1705		
		iii) interlocking concrete segmental paving blocks, including a 20mm river sand bedding layer, jointing sand (plaster sand) and mortar infill between edge restraint and blocks	m²	50		
		iv) Concrete slabs (450 x 450mm) including a 20mm river sand bedding layer, jointing mortar	m²	389		
		v) Brick paving including a 20mm river sand bedding layer, jointing sand (plaster sand) and mortar infill between edge restraint and bricks	m²	100		
		vi) Unreinforced concrete ≤ 75mm thick (15MPa)	m²	300		
		vii) Reinforced concrete ≤ 75mm thick (15MPa)	m²	199		
		viii)Grassing	m²	1590		
		ix) Kerbing, including a 50mm bedding (cement and river sand), jointing mortar and 15MPa concrete haunching at all joints	m	380		
2.6	**PSC 8.2.13**	Reinstatement of existing masonry walls and palisade fences				
		a) Face Brick				
		i)110mm wall	**m²**	300		
		ii) 220mm wall	m²	300		
		ii)330mm wall	**m²**	250		
		b) Plastered Brick				
		i)110mm wall	m²	120		
		ii) 220mm wall	m²	120		
		ii) 330mm wall	m²	100		
		c) Steel Palisade fences (2.1m height)	m²	400		
		d) Concrete Palisade fences (2.1m height)	m²	20		
CARRIED TO SUMMARY: SITE CLEARANCE						

Item No.	Payment Clause	Description	Unit	Qty	Rate	Amount
3	**SANS 1200DB**	**SCHEDULE 3: EARTHWORKS (PIPE TRENCHES)**				
3.1	8.3.2	Excavation				
		(a) Excavate in all materials, backfill and compact and dispose of surplus and unsuitable materials within the free haul distance, for trenches				
		i) > 0m but ≤ 1.0m deep	m³	14480		
		ii) > 1.0m but ≤ 2.0m deep	m³	8280		
		iii) > 2.0m but ≤ 3.0m deep	m³	5175		
		iv) > 3.0m deep	m³	200		
		(b) Extra over item (a) above for:				
		i) Intermediate material	m³	8300		
		ii) Hard rock material	m³	2500		
		iii) Boulder excavation	m³	100		
	8.3.4	(c) Extra over item (a) above (shoring and or bracing of trench sides) for:				
		i) > 0m but ≤ 1.0m deep (using timber sheeting)	m	0		
		ii) > 1.0m but ≤ 2.0m deep (using timber sheeting)	m	5000		
		iii) > 2.0m but ≤ 3.0m deep (using timber sheeting)	m	1000		
		iv) > 3.0m deep (using steel sheeting)	m	100		
	PSDB 8.3.2(3)	d)'Excavate by hand in all material for tie-ins, house connections, backfill and compact including disposal of surplus unsuitable material for depth:				
		i) > 0m but ≤ 1.0m deep	m	498		
		ii) > 1.0m but ≤ 2.0m deep	m	58		
		iii) > 2.0m deep	m	15		
3.2	8.3.3	Excavation ancillaries				
3.2.1	8.3.3.1	Make up deficiency in backfill material:				
		a) By importation from commercial source or off-site sources selected by the Contractor	m³	6507		
		Additional compaction				
3.2.2	8.3.3.3	Compaction in road reserve				
		a) Additional compaction to 93% mod AASHTO density in road reserves	m³	5000		
3.2.3	PSDB 8.3.5	Existing services that intersect or adjoin a pipe trench:				
		a) Service that intersect a trench				
		(i) Cables.	No.	1350		
		(ii) Water mains	No.	10		
		(iii) Water house connections	No.	1950		
		(iv) Sewer pipes	No.	1150		
		(v) Storm water pipes	No.	1304		
		(vi) Kerbs and channels	No.	233		
		b) Services that adjoin a trench				
		(i) Cables.	m	24500		
		(ii) Water mains	m	24500		
		(iii) Storm water pipes	m	120		
		(iv) Kerbs and channels	m	100		
		(v) Sewer pipes	m	7350		
		(c) Services that require special care	No	250		
CARRIED TO SUMMARY: EARTHWORKS PIPE TRENCHES						

Item No.	Payment Clause	Description	Unit	Qty	Rate	Amount
4	**SANS 1200LB**	**SCHEDULE 4: BEDDING (PIPES)**				
4.1		Provision of bedding:				
	8.2.1	(a) from trench excavations				
		i) selected granular material	m³	4325		
		ii) selected fill material	m³	3528		
		iii) Extra over item 4.1(a) and (b) for sieving where ordered by Engineer	m³	3528		
	8.2.2.3	(b) from commercial sources				
		i) selected granular material	m³	1730		
		ii) selected fill material	m³	1441		
		(iii) Bidim A2	m²	0		
		(iv) 19mm crusher run stone	m³	110		
		(v) River sand	m³	80		
		(vi) Dump Rock	m³	30		
4.2	8.2.4	a) Encasing of pipe in 20MPa concrete (Provisional)	m³	32		
		b) Concrete for Thrust/anchor blocks (including all required formwork) as per detail JW100-DET05-W01	m³	300		
CARRIED TO SUMMARY: BEDDING PIPES						

Item No.	Payment Clause	Description	Unit	Qty	Rate	Amount
5	**SABS 1200L**	**SCHEDULE 5: MEDIUM PRESSURE PIPELINES**				
5.1	8.2.1	a) Supply, lay, bed (class B bedding), all test and disinfect, backfill complete with victaulic couplings denso wrapped including knock on collars at joints, high impact mPVC Class 16 pipes:				
		i) DN110	m	18366		
		ii) DN160	m	4339		
		iii) DN200	m	10		
		iv) DN250	m	2142		
	PSL 8.2.24.2	b) Supply, handle, lay and test through Horizotal Direction Drilling including supply of pipe material and welding and drilling equipment for road crossings :				
		HDPE PE100 SDR11 PN16 pipes:				
		i) DN110	m	4000		
		ii) DN160	m	1800		
		iii) DN250	m	910		
5.2		Extraover item above for drilling in hard material	m	1075		
5.3		Excavate in all materials Launching and reception shafts	m^3	136		
		Fittings to suit High Impact Class 16 mPVC pipes				
5.4	8.2.2	a) Shouldered end Steel Bends Fusion Bonded Epoxy coated 250 microns including thrust blocks to suit high impact mPVC pipe:				
5.4.1		**DN110**				
		i) 11¼°	No	116		
		ii) 22.5°	No	45		
		iii) 45°	No	22		
		iv) 90°	No	18		
5.4.2		**DN160**				
		i) 11¼°	No	46		
		ii) 22.5°	No	18		
		iii) 45°	No	9		
		iv) 90°	No	7		
5.4.3		**DN250**				
		i) 11¼°	No	65		
		ii) 22.5°	No	36		
		iii) 45°	No	29		
		iv) 90°	No	23		
5.4.4	8.2.2	b) Shouldered end Steel Reducer Fusion Bonded Epoxy coated 250 microns to suit High Impact mPVC pipe:				
		i) 150mm x 100mm dia.	No	34		
		ii) 200mm x 100mm dia.	No	22		
		iii) 200mm x 150mm dia.	No	13		
		iv) 250mm x 100mm dia.	No	12		
		v) 250mm x 150mm dia.	No	9		
		vi) 250mm x 200mm dia.	No	7		
SUM CARRIED FORWARD						

Item No.	Payment Clause	Description	Unit	Qty	Rate	Amount
5.4.5	8.2.2	c) Steel Tees Fusion Bonded Epoxy coated 250 microns to suit High Impact mPVC piping including thrust block				
		i) 100mm dia. equal tee	No	40		
		ii) 150mm dia. equal tee	No	40		
		iii) 150mm x 100mm dia. reducing tee	No	18		
		v) 200mm x 100mm dia. reducing tee	No	18		
		iv) 200mm x 150mm dia. reducing tee	No	13		
		v) 250mm equal Tee	No	36		
		vi) 250mm x 100mm dia reducing Tee	No	14		
		vii) 250mm x 150mm dia reducing Tee	No	13		
		viii) 250mm x 200mm dia reducing Tee	No	5		
5.4.6		d) Steel Flanged Crosses, Fusion Bonded Epoxy coated 250 microns to suit High Impact mPVC piping including thrust block				
		i) 100mm dia. equal cross	No	10		
		ii) 150mm dia. equal cross	No	8		
		iii) 200mm dia. equal cross	No	1		
		iv) 150mm x 100mm dia. unequal cross	No	6		
		v) 200mm x 100mm dia. unequal cross	No	4		
		vi) 200mm x 150mm dia. unequal cross	No	3		
		vii) 250mm equal cross	No	3		
		viii) 250mm x 100mm dia unequal cross	No	2		
		ix) 250mm x 150mm dia unequal cross	No	25		
		x) 250mm x 200mm dia. unequal cross	No	25		
		xi) 300mm equal cross	No	30		
5.4.7		i)DN110	No	5		
		ii) DN160	No	4		
		iii) DN250	No	5		
5.4.8		Extra-over item 8.2.2 for encasing joints (Denso wrapping or similar approved of metal joints).	No	480		
5.5	PSL 8.2.22	i) Laboratory Testing of HDPE joints	Prov Sum	1	R 100 000,00	R 100 000,00
		ii) Profit on item 5.2.4f (vii) above	%	100000		
5.6	PSL 8.2.19	a) Supply, fixing and bedding of valves with its fittings complete (including chambers as per drawing JW100-DET03-W01. Gate Valves Class 16, anti-clockwise closing (except for Midrand Depot) for the following pipe sizes: Valves to be manufactured in accordance with SANS 664				
		i) DN100 RSV Class 16 Non rising spindle Detail JW100-DET03-W01	No	128		
		ii) DN150 RSV Class 16 Non rising spindle Detail JW100-DET03-W01	No	40		
		iv) DN 250 Wedge Type Class 16 Non rising spindle Detail JW100-DET03-W01	No	22		
SUM CARRIED FORWARD						

Item No.	Payment Clause	Description	Unit	Qty	Rate	Amount
	PSL 8.2.19	b) Supply, fixing and bedding of above ground fire hydrants with fittings and galvanised pipe for connection to the main line as per detail JW100-DET06-W01 (Rate to include all fittings required to connect to main line e.g. tees, bends, distance piece, approved coating on the fire hydrant etc.)				
		i) DN80 fire Hydrant mainline 110mm dia	No	100		
		ii) DN80 fire Hydrant mailine 160mm dia	No	28		
		iv) DN80 fire Hydrant mainline 250mm dia	No	15		
5.7	8.2.4	Extra-over 5.1 for cutting and joining of pipes to length where required:				
		a) '"Press on" shouldered end collars including 1 victaulic coupling for uPVC pressure pipe:				
		i) DN110	No	189		
		ii) DN160	No	120		
		iv) DN250	No	83		
		b) Steel Flanged Adaptors with victaulic ends, Fusion Bonded Epoxy coated 250 microns to suit High Impact mPVC piping including thrust block				
		i) DN110	No	189		
		ii) DN160	No	120		
		iv) DN250	No	83		
		c) Steel flanged adaptors (VJ type), Fusion Bonded Epoxy coated 250 microns to suit High Impact mPVC piping including thrust block				
		i) DN110	No	38		
		ii) DN160	No	24		
		iv) DN250	No	17		
5.8	8.2.15	Special wrapping in corrosive soil per joint and as instructed by the Engineer	No	18		
5.9		**Tying into existing Pipes**				
5.9.1	PSL 8.2.17	Tying into existing water line. Supply all fittings to suit pipe size including labour for the following pipe sizes, excavations will be allowed under pipe excavations:				
		a) Tying new 110mm-160mm uPVC/HDPE/mPVC into existing steel/HDPE/AC/uPVC pipes for the following pipe sizes:				
		i) 100mm to 200mm	No	34		
		ii) 201mm to 400mm	No	13		
		b) Tying new 200mm-250mm uPVC/HDPE/MPVC into existing steel/HDPE/AC/uPVC pipe for the following pipe sizes:				
5.9.2	PSL 8.2.18	a) Recover valves, fittings, meters, specials of all sizes etc and deliver to the respective Depot or as instructed by the Employer's Agent.				
		i) Valves following sizes:				
		1) 100mm to 300mm	No	1168		
		ii) Fire Hydrants	No	143		
		iii) Water meters all sizes	No	2194		
CARRIED TO SUMMARY: MEDIUM PRESSURE PIPES						

Item No.	Payment Clause	Description	Unit	Qty	Rate	Amount
6	**SABS 1200LF**	**SCHEDULE 6: ERF CONNECTIONS (WATER)**				
6.1	8.2.2	Supply, lay and test HDPE Class 16, PE100 SDR11 Erf connections (Rate to include all compression fittings for connecting to the main line and the water meter) as per detail JW100-DET07-W01. Erf connection length 20 metres				
6.1.1		***a) Using open trench construction***				
		i) 25mm dia. connections	No	300		
		ii) 32mm dia. connections	No	300		
		iii) 40mm dia. connections	No	300		
		iv) 50mm dia. connections	No	20		
6.1.2	PSL 8.2.24.2	***b) Using trenchless methods Horizontal Directional Drilling (The following rates should cover everything except launch and reception pits***				
		ii) 32mm dia. connections	No	150		
		iii) 40mm dia. connections	No	150		
		iv) 50mm dia. connections	No	300		
		iv) 63mm dia. connections	No	120		
6.1.3		Excavate in all materials Launching and reception shafts	m^3	136		
6.2	8.2.3	Extra over items 6.1 for specials				
6.2.1		*a) Saddles (to suit High Impact mPVC and OPVC pipes): Complete with bolts , nuts, flat gaskets, seals and stiffened ring.Include drilling hole DN of fitting Ø.Offtake to be BSP threaded (Plasson or similar approved by the Engineer in writing)Include for painting bolts with bituminous corrosion*				
		i) 110mm x 25mm	No	1070		
		ii) 110mm x 32mm	No	350		
		iii) 110mm x 40mm	No	32		
		iv) 110mm x 50mm	No	16		
		vi) 160mm x 25mm	No	200		
		vii) 160mm x 32mm	No	120		
		viii) 160mm x 40mm	No	8		
		ix) 160mm x 50mm	No	2		
6.2.2		b) Saddle clamps for HDPE pipes Class 16: Complete with bolts , nuts, flat gaskets, seals and stiffened ring.Include drilling hole DN of fitting Ø.Offtake to be BSP threaded (Plasson or similar approved by the Engineer in writing)Include for painting bolts with bituminous corrosion				
		i) DN110	No	1179		
		ii) DN 160	No	500		
6.3	8.2.6	*Stopcock (Supply and install brass ball/gate valve stopcock, rate to include all fittings to connect to the HDPE pipes)*				
		i) 25mm	No	1120		
		ii) 32mm	No	64		
		iii) 40mm	No	38		
		iv) 50mm	No	2		
SUM CARRIED FORWARD						

Item No.	Payment Clause	Description	Unit	Qty	Rate	Amount
6.4	8.2.4	Supply and install Meters complete with couplings				
		i) 15mm Class C above ground (in a box) domestic water meters (rate to include all fittings for connecting to the erf connection)	No	1080		
		ii) 20mm Class C above ground (in a box) domestic water meters (rate to include all fittings for connecting to the erf connection)	No	1080		
		iii) 32mm Class C above ground (in a box) domestic water meters (rate to include all fittings for connecting to the erf connection)	No	8		
		iv) 32mm Class B above ground bulk water meters(rate to include all fittings for connecting to the erf connection as per detail JW100-DET09-W01	No	16		
		v) 40mm Class B above ground bulk water meters(rate to include all fittings for connecting to the erf connection as per detail JW100-DET09-W01	No	10		
		vi) 50mm Class B above ground bulk water meters(rate to include all fittings for connecting to the erf connection as per detail JW100-DET09-W01	No	1		
		vii) 63mm Class B above ground bulk water meters(rate to include all fittings for connecting to the erf connection as per detail JW100-DET09-W01	No	8		
		viii) 80mm Class B above ground bulk water meters(rate to include all fittings for connecting to the erf connection as per detail JW100-DET09-W01	No	1		
		xi) 100mm Class B above ground bulk water meters(rate to include all fittings for connecting to the erf connection as per detail JW100-DET09-W01	No	1		
6.5	8.2.5	Site testing of water meters, where ordered by Engineer (Provisional)	Prov Sum	1	R 100 000,00	R 100 000,00
6.6		Profit on item 6.5 above	%	100000		
6.7	8.2.8	i) Markings in reflective paint for valves and hydrants as per detail JW100-DET13-W01	No	311		
		ii) Concrete Marker posts for valves and hydrants as per detail JW100-DET13-W01	No	311		
CARRIED SUMMARY: ERF CONNECTIONS (WATER)						

Summary Page

1,00	SCHEDULE 1: PRELIMINARY AND GENERAL	
2,00	SCHEDULE 2: SITE CLEARANCE	
3,00	SCHEDULE 3: EARTHWORKS (PIPE TRENCHES)	
4,00	SCHEDULE 4: BEDDING (PIPES)	
5,00	SCHEDULE 5: MEDIUM WATER PIPES	
6,00	SCHEDULE 6: ERF CONNECTIONS (WATER)	
7,00	**SUBTOTAL 1**	
8,00	Add Escalation (@ 7% of Subtotal 1)	
9,00	**SUBTOTAL 2**	
10,00	Add Contingencies (@ 10% of Subtotal 2)	
11,00	**SUBTOTAL 3**	
12,00	Add VAT (15% of Subtotal 3)	
13,00	**GRAND TOTAL**	

Johannesburg Water SOC Ltd

CONTRACT NO: JW14508

MAYFAIR WATER PIPE REPLACEMENT

VOLUME 2

PART 3: SCOPE OF WORK

Employer:		**Contractor:**	
Witness:		**Witness:**	

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C3 PREAMBLE TO SCOPE OF WORK

GENERAL

This section specifies and describes the supplies, services and Employer's Agenting 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 two portions:

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

Portion 2: VARIATIONS AND ADDITIONS TO THE STANDARDISED SPECIFICATIONS covers variations to the standardised specifications and particular specifications, which are applicable to the contract.

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

STATUS

The Project Specifications together with the drawings and Schedule of Quantity indicate the section of Standard Specification applicable to this Contract.

In the event of any discrepancy between parts of the Standard Specification and the Project Specifications, the latter shall take precedence and shall govern.

Should any requirement of the Particular Project Specification conflict with any requirement of the Project Specification or Variations and Additions to the Standardised Specifications, the requirements of the Particular Project Specifications shall prevail.

DEFINITIONS

For the purpose of this Contract the following shall have the associated meaning:

a) Unless inconsistent with the context, an expression which denotes:
   i) any gender includes the other genders;
   ii) a natural person includes a juristic person and vice versa; and
   iii) the singular includes the plural and vice versa.

b) ***'Castellation'*** shall mean alternating white and black boxes at the perimeter of a test chart. Useful to test TV picture positioning on the display screen, also to observe picture cropping, display registration, etc.

c) ***'Fittings'*** shall mean access junctions, access bends, socket bends, plain bends, access reducing junction, rodding eye, square junction, gulley trap and inspection eye.

d) ***'Launch pit'*** shall mean the excavation or manhole from which the replacement pipe is inserted.

e) ***'Pipe bursting or cracking'*** shall mean the bursting of an existing pipe with a device which displaces the existing pipe fragments into the surrounding medium and leads in a replacement pipe immediately behind.

f) '***Pipe length'*** shall mean the existing or proposed length of pipe between manholes or perpendicular streets.

g) ***'Property connection'*** shall mean a pipe which connects a property drain to a collector sewer or manhole or the meter to the secondary supply mains. In addition to straight pipes, it includes a junction on the collector sewer or saddle on the secondary supply mains.

h) ***'Property connection junction'*** shall mean the point of connection of the property connection with the collector sewer or water main.

i) ***'Reception pit***' shall mean the excavation or manhole where the replacement pipe finishes.

j) '***Service Provide***r' shall mean either a consultant or contractor appointed to provide a particular service, i.e. investigations, design, labour provision and/or construction.

k) '***VAT***' shall mean Value Added Tax in terms of the Value Added Tax Act 89 of 1991 as amended.

ABBREVIATIONS

For the purpose of this Contract the following abbreviations shall have the associated meaning:

ASTM	: American Society for Testing and Materials
avi	: Audio Video Interleaved Format
BEE	: Black Economic Empowerment
BS	: British Standard
CCD	: Charge-coupled Device
CCTV	: Close-circuit television
CD	: Compact Disk
CE	: Civil Employer's Agenting Works
CIDB	: Construction Industry Development Board
CIPP	: Cure-In-Place-Pipe
CoJ	: City of Johannesburg
COP	: Code of Practice for Work within the Road Reserve
DVD	: Digital Versatile Disk
ECSA	: Employer's Agenting Council of South Africa
EDA	: Enterprise Declaration Affidavit
EMP	: Environmental Management Plan
EPWP	: Expanded Public Works Programme
Ext	: Extension
GB	: Gigabytes
GCC	: General Conditions of Contract
GIS	: Geographic Information System
HD	: High Definition
JRA	: Johannesburg Road Agency
JW	: Johannesburg Water SOC Ltd
Kl	: Kilolitres

l	: Litres
LOS	: Level of Service
Ml	: Megalitres
Mod AASHTO	: Modified American Association of State Highway and Transportation Officials
mov	: Quick Time Movie File Format
MPEG	: Movie photographic experts group
mpg	: MPEG Video Format
MSCC	: Manual for Sewer Condition Classification, Fourth Edition (2004)
SABS	: South African Bureau of Standards
SANS	: South African National Standard
SD	: Standard Definition
SOP	: Standard Operating Procedure
WRC	: Water Research Commission
uPVC	: Unplasticised Polyvinyl Chloride
mPVC	: Modified Polyvinyl Chloride
VAT	: Value Added Tax

PORTION 1: PROJECT SPECIFICATION AND GENERAL INFORMATION

PS1 DESCRIPTION OF THE WORKS

PS1.1 Employer's Objectives

The primary objective of project is to deliver public infrastructure by upgrading and replacing old water pipes with new water pipes in the Mayfair suburb within the Johannesburg City area. The secondary objective of the project is that optimum utilization shall be made of the resources within the local community and that these resources shall be improved and enhanced through their participation in the execution of the works. The projects to be implemented has taken into cognizance the prescripts of EPWP and local SMMEs.

PS1.2 Overview of the Works

The works to be carried out under this contract are listed below:

The Contractor's obligations under the Contract comprise the construction, completion and maintenance of the Works. The provision of all labour, materials, construction plant, temporary works and everything, whether of a temporary or permanent nature required in and for such construction, completion and maintenance so far as the necessity for providing the same is specified in or reasonably to be inferred in the Contract.

PS1.3 Extent of the Works

The above works also includes the following:

- Site clearance: All topsoil, vegetation and shrubs need to be removed before commencement of excavations.
- The contractor will be required to expose existing services before construction to confirm the exact position of the services.
- Excavation of trenches for the new water pipeline.
- Supply, lay of pipeline using an open trench and trenchless technology methods, bed, test, disinfect and backfill. Bulk line pipes shall comply with SANS specifications and the Johannesburg Water's guidelines.
- Construction of valve chambers.
- Installation of new valves
- Installation of new above ground water meters.
- Installation of fire hydrants.

- Recovery of old valves and fire hydrants.
- Protecting existing services.
- All existing services need to be exposed before commencement of work.
- Slope protection.
- Tie in new water pipes into existing water pipes
- Reinstate the surfaces to an original condition.

The Contractor's obligations shall also include strict compliance with any Environmental requirements and/or reports deemed to form part of this Contract as well as any Occupational Health and Safety requirements.

This description of the works is not necessarily complete and shall not limit the work to be carried out by the Contractor under the Contract. Approximate quantities of each type of work are given in the Schedule of Quantities.

PS1.4 Location of the Works

The location of the project is in Mayfair suburb in Region F of the City of Johannesburg.

NOTA BENE: Refer to the locality drawing included in Volume 3 of this Contract Document.

PS1.5 Temporary Works

Temporary works shall:
The Contractor shall, as relevant:

a) Provide temporary drainage works, temporary pumps and other equipment as might be necessary for the protection, draining and dewatering of the works; and
b) Construct and maintain haulage, temporary access and construction roads, subject to the approval of the Employer, and permit the Employer, other Contractors, statutory bodies or any other person who might require legitimate access to or through the site for the purpose of executing legitimate business, free and unhindered usage of such roads.
c) Temporary water connections, Contractor's offices, storage sheds, latrines, barricading of Works shall be located in an approved position and subject to the approval of all authorities concerned.
d) Safety and security of the Contractors' temporary works shall be at the Contractors' discretion, but always in accordance with stipulated Occupational Health and Safety requirements.
e) The camp shall be adequately guarded during or outside working hours.
f) Include the works required to locate, verify and protect existing services within the works area;
g) Be such to ensure no or limited interruption to vehicular and pedestrian traffic; and
h) Be such as to allow the continued or uninterrupted sewage flow. The Contractor, under the supervision of an experienced manager (from the Contractor personnel), may install plugs in the sewers to prevent the flow of sewage during inspection for

a period of no longer than 10 The plugs must then be removed for a minimum of 10 minutes after which time they may be installed again for the period stated above. Plugs shall only be installed when and for the time period directed by the Employer's Agent where the existing flow hinders proper inspection

i) Be such that existing stormwater flow shall not be impeded during survey and construction activities.

Further the Contractor shall note that no stockpiling of materials, plant, excavated material or any other construction related infrastructure shall be allowed in locations that may interfere with the operations of the Employer and the public in general.

PS2 ENGINEERING

PS2.1 Employer's Agent Design

The Employer's design has been completed by Johannesburg Water – Engineering Services Unit (the Employer's Agent) on behalf of the Employer.

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.

Tenderers are free to propose alternative equipment to that proposed in the specifications and, provided that drawings with details of each alternative proposal are submitted with the Tender, such alternative proposals shall be considered in the adjudication of a Tender. Full details of any changes must be included with the tender. The cost of any changes to the Employer's design shall be for the Contractor's account where full details of the changes were not submitted with the tender.

The Contractor undertakes only construction on the basis of designs issued by the Employer's Agent. The Contractor is to follow the specifications, the design and construction drawings as laid out by the Employer's Agent. Tenderers must satisfy themselves that the layouts as provided in the tender documentation suit in all respects the equipment proposed by the Employer or by the Tenderer as the case may be. Where equipment other than that proposed by the Employer's Agent is accepted, it will be the sole responsibility of the Contractor to ensure that the associated equipment including pipe work is compatible with the accepted material and proposed structures.

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

An extension of time for Practical 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 Employer's Agent'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 Works.

PS2.2 Drawings

PS2.2.1 Volume 3

Drawings are included in Volume 3 of this Contract Document based on current available information. Such drawing may be updated (based on actual site situation uncovered during execution of the works) and re-issued during the Contract Period as required.
Drawings include:

a) Locality plans
b) Layout drawings
c) Typical construction details

The as-built records to be submitted by the Contractor to the Employers agent must include:

a) Hard copy drawings indicating mark-ups of amendments, as updated on site
b) Updated electronic/soft copy drawings (in Revit and/or AutoCAD compatible type files), at no additional cost to the Employer. Original may be provided by the Employers' Agent, on request, where available.

PS2.2.2 Construction drawings

Upon receiving the instruction to commence with construction the Contractor shall receive 3 sets of construction drawings, of which 1 set shall be designated for as-built records and updated by the Contractor on a daily basis. The later shall be:

a) Made available to the Employer's Agent or his duly authorised representative within 24hours on request;
b) Submitted to the Employers' Agent with the Contractor's request for issue of the Practical Completion Certificate.

PS2.2.3 Shop drawings

Where an item to be supplied in conformance with this Contract specification has not been designed by the Employer's Agent or Employer, the Contractor shall be required to supply the Employer's Agent with 3 copies of detailed shop drawings prior to delivery of materials, including an electronic copy in drawing format that is compatible with the software packages (AutoCAD or DXF) used by the Employer's Agent and/or Employer.

NOTA BENE: Only on approval of such shop drawings or an amended version thereof, shall the Contractor proceed with the manufacturing, supply and installation of the designed item.

PS2.2.4 Survey report drawings

The Contractor shall submit with his survey report(s) a set of drawings highlighting:

a) the location of valves, fire hydrants and

b) the location of any other services discovered during construction that were not previously indicated on the provided drawings.

PS2.2.5 Record drawings

The set of drawings issued as per clause PS2.2.2 (Construction drawings) for recording survey findings showing manhole numbers that coincide with the survey report coding sheets and video recording, shall be returned to the Employer's Agent on completion of the Contract. The drawings shall be clearly annotated to show any discrepancies between the Employer's record drawings and the contents of the survey report. Such discrepancies shall be brought to the attention of the Employer's Agent during the survey.

PS3 PROCUREMENT

PS3.1 Preferential Procurement Procedures

The Employer's promotes preferential procurement. The philosophy of the process and mechanics of the points scoring system are described in section MBD 6.1, which is included in the returnable documents section T2.1.

The Contractor's attention is drawn to the following returnable schedules contained in Part T2:

a) Empowerment and Preferential Procurement (MBD 6.1); and

b) Enterprise Declaration Affidavit (to be endorsed by a Commissioner of Oaths) (JW11).

These schedules contain all requirements with regard to preferential procurement.

PS 3.2 SUBCONTRACTING

PS 3.2.1 Definitions

Unless inconsistent with the context in these specifications, the following terms, words or expressions shall have the meanings hereby assigned to them:

1. Start-up Enterprises

   An enterprise that has been in existence and operating for less than two years.

2. Small Enterprises

   An enterprise that has a CIDB grading designation of 1 or 2.

3. Micro Enterprises

   An enterprise that has a CIDB grading designation of 3.

4. Locally based SMMEs

   Enterprises that have their operational base in the ward in which the project is to be executed or, alternatively, the members of the enterprise are resident in the particular ward. Should a suitable locally based SMME as defined above not be available in the particular ward, then they shall be sourced from adjacent wards.

5. Contract Participation

   Contract Participation in terms of this contract is a process by which the Employer implements Government's objectives by setting a target relating to small Contractor development which the Contractor shall achieve as a minimum.

6. Contract Participation Goal (CPG)

Contract Participation Goal is the monetary value of the target set by the Employer in the Contract Participation process.

7. Contract Participation Performance (CPP)

Contract Participation Performance is the measure of the Contractor's progress in achieving the CPG.

The commitment of the Employer concerning the empowerment of the SMMEs shall be noted and adhered to by the main contractor. It is against this background that Johannesburg Water has made provisions under this contract to ensure that the main contractor impart skills to the local sub-contractors within the project area during the project implementation.

It is the intention of Johannesburg Water that the minimum targeted participation goal for the local sub-contractors is for but not limited to the full value of subcontracting works identified by the Employer as covered in the Bill of Quantities. The onus is upon the main contractor to handle and manage the procurement process of the sub-contractors and once appointed, should be dealt with in accordance with the provisions of Clause 4.4 of the General Conditions of Contract 2015 for Construction Works Third Edition.

The identified scope of work by the Employer includes but not limited to the following:

- Site Clearance of the pipeline route.
- Pipe Supply and Laying
- Construction of pre cast concrete manholes
- Erf reconnections
- Excavation of launch and reception pits
- Hand excavation (where feasible)
- Reinstatement of surfaces to original condition
- Maintaining good public relations with Johannesburg Water's customers and the public.

The minimum requirements for selection of the sub-contractors are as follows:

a. Valid CIPC registration (i.e. CK, COR)
b. SA ID copies of owners
c. Active CIDB membership: **minimum grading 1CE**
d. Valid CSD compliance status
e. Valid EME affidavit
f. COIDA certificate
g. Company Profile including similar experience and skilled personnel CVs
h. Health and Safety Plan

The Contractor is to allow for monthly certificates from the SMMEs and for payment to the SMMEs to be affected within 30 days of certification. In order to achieve the goals of this policy and to ensure that the SMMEs are treated fairly and given every opportunity to advance their business whilst delivering a successful project, the Contractor is to note the following and provide for any cost that may be associated therewith.

8. The Contractor shall subcontract local SMME works to be determined, as feasible and in consultation with the Employers' Agent.
9. The Contractor will be expected to have clearly specified the programme dates to the SMME and these dates are to be included in the contractual agreement between the two parties. The Contractor is to monitor the SMME's progress against the programme and hold progress meetings with the SMME contractors where minutes are to be kept and signed off by both parties.
10. Before site establishment, the Contractor will provide each appointment letter and contractual agreement that the Contractor engages with for each SMME on this Project. The Agreement must include agreed work values agreed upon with the Contractor and SMME.
11. Before site establishment, the Contractor will provide the following for all SMMEs:
    a) SMME company registration
    b) SMME CIDB proof of registration.
12. The Contractor is to assess the skills of the SMME and provide the relevant support and training for the SMME to complete the works to programme, budget and specification. The Contractor will be expected to provide training to the SMME that will ensure that the SMME's staff is suitably trained to execute the works and that they receive sufficient relevant experience on the project.
13. The Contractor is responsible for safety compliance on the project and will assist the SMME Contractors in all aspects to achieve safety compliance, that will include:
    a) Assisting the SMME with developing their safety files, legal appointments, etc.
    b) Assisting the SMME with achieving safety on site.
    c) Having toolbox talks with the SMME Contractor's employees on a daily basis.
    d) Providing all safety equipment and signage.
    e) Providing safety training where necessary.
14. The Contractor is to provide all the necessary equipment for the timeous monitoring and the checking of the quality of works as carried out by the SMME. The Contractor will be expected to monitor the SMME's works for quality compliance and provide all the necessary support to the SMME in order to achieve quality requirements. The Contractor is to ensure that if the SMME's quality of works does not achieve specification, the Contractor will assist the SMME to achieve specification and not allow the works to continue until the quality requirements are achieved.
15. The Contractor is to generate monthly reports for the Johannesburg Water SOC. which includes the following:
    a) Per SMME: resources on the site, i.e. supervisors, labour, plant tools and equipment
    b) Per SMME: progress of works on site.
    c) Per SMME: quality control on site.
    d) SMME expenditure on the project versus target expenditure including payment progress
    e) Copies of minutes of the SMME and Contractor progress meetings.
    f) Concerns and improvements to be made.
16. In the execution of the Subcontract Work, the Contractor shall ensure that the Sub-Contractor(s) comply with all relevant legislation and regulations including,

but not confined to, the Occupational Health and Safety Act. The Contractor hereby indemnifies the Employer against any loss, damage, or claim for Subcontract Works arising out of the former's failure to comply with instructions issued to him in regard to these requirements.

17. The Contractor shall be required to adopt labour intense construction techniques where feasible to do so and in consultation with the Employers' Agent, with the proviso that the Employer's specific objectives regarding time and quality are not compromised. Maximisation of employment shall be the aim on this contract.
18. Together with their tenders, all Contractors are required to submit a comprehensive implementation plan clearly stating the labour content and number of jobs that shall be created. The employment of labour shall be reflected in a programme in sufficient details to enable the Employers' Agent to monitor and compare it with the implementation plan.
19. The Contractor shall be required to submit employment data on a monthly basis to the Employer's Agent.

Contractors are to also note that it is an explicit condition of this Contract that all unskilled labourers on the project are to be employed from the local community. The Contractor shall, in general, maximise the involvement of the local community

PS 3.2.2 PERFORMANCE AND EXECUTION OF THE SUBCONTRACTED WORK

The main contractor must ensure that his subcontractors shall supply sufficient, suitable resources (e.g. equipment, labour, material) to execute all the Subcontract Work including the portion identified by the Employer as outlined in the Scope of Work PS 3.2 and Bill of Quantities.

The Contractor shall also ensure that the Subcontractor(s) shall execute the Subcontract Work in accordance with the Scope of Work and Programme to the reasonable satisfaction of the Employer.

PS 3.2.3 QUALITY OF THE SUBCONTRACT WORK

In accordance with the requirements of Clause 4.4 in the General Conditions of Contract for Construction Works (2015), 3rd Edition, it is the responsibility of the Contractor to ensure that the Subcontractor shall be capable of executing the Subcontract Work efficiently and in accordance with the Scope of Work.

PS 3.2. LAWS AND REGULATIONS

The following Acts, as amended from time to time, are predominant amongst those which apply to the construction industry. The Contractor shall ensure that the Subcontractor(s) complies with the 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

- The Constitution of South Africa.
- Preferential Procurement Policy Framework Act No. 5 of 2000.
- Construction Industry Development Board Act No. 38 of 2000.
- Broad-Based Black Economic Empowerment Act No. 53 of 2003.
- Income Tax Act, the
- Compensation for Occupational Injuries and Diseases Act,

- Unemployment Insurance Fund,
- Basic Conditions of Employment Act,

PS 3.2.4 RESOURCES TO COMPLETE SUBCONTRACT WORK

Although it is preferred by JW that the Contractor ensure that the Subcontractor(s) supply all required resources such as labourers, equipment, hand tools, power-driven tools if need be, which are required for the execution of the Subcontract Work, however the onus is upon the Contractor to determine the extent of resources the subcontractor shall supply to ensure that the works are completed on time. The agreement between the Contractor and subcontractor is the Contractor's responsibility and JW is indemnified from any agreements entered between Contractor and his Subcontractor (s).

PS 3.2.5 PAYMENT

The Contractor shall ensure that sub-contractor(s) are paid within stipulated time as per the signed Agreement with the subcontractor failure which the Contractor can be reported to the Employers' Supply Chain Department and may prejudice his future employment with Johannesburg Water.

PS 3.2.6 RETENTION MONIES

The Employer will deduct Retention money for the overall works including the Subcontract Work at the percentage stated in the Contract Data.

PS 3.2.7 RESOLUTION OF DISPUTES

Should any dispute between the Contractor and the Subcontractor arise out of the provisions

of the Subcontract, or the execution of the Subcontract Work, every effort shall be made by

the Parties to resolve the matter themselves without the intervention of the Employer. The agreement signed between the Contractor and Sub-contractor should state dispute resolution procedure, and also address late payment issues should it arise.

PS 3.2.8 LOCAL SUBCONTRACTIONG WORK

a) The 20% of the project amount shall be set aside for Local SMMEs Subcontracting work.

b) The 10% of the Sub Contracting amount mentioned in (a) above, shall be set aside for Preliminary and General Items of the Subcontractors and which will be limited to Supervision, Tools and equipment, OHS obligation, for all other facilities such as Site Camp, storage of tools etc. the Subcontractors will use the Contractor's facilities.

c) The remaining 90% of the Sub Contracting amount mentioned in (a) above, shall be for actual work.

d) The Contractor will identify items in the BOQ to be subcontracted and a separate BOQ for subcontracting will be prepared and submitted for approval..

e) In cases where the Subcontractors rates are high and subcontracting sum is more than what is allowed for in the Sub Contracting amount, then the Contractor's rates will apply.

PS4 CONSTRUCTION

PS4.1 Applicable Standards

PS4.1.1 General Conditions

The "Special Condition of Contract" to be read in conjunction with the "General Conditions for Construction Works 2015 Third Edition (GCC 2015).

PS4.1.2 National standards

The Standard Specifications for all associated civil work applicable to this Contract shall be:

SANS	Description
28	: Metal ties for cavity walls (1986)
227	: Burnt clay masonry units (2007)
282	: Bending dimensions and scheduling of steel reinforcement for concrete (2004)
523	: Limes for use in building (2007)
558	: Cast iron surface boxes and manhole and inspection covers and frames (1973)
674	: 2008
920	: Steel bars for concrete reinforcement (2005)
1024	: Welded steel fabric for reinforcement of concrete (2006)
1083	: Aggregates from natural sources - Aggregates for concrete (2006)
1090	: Aggregates from natural sources - Fine aggregates for plaster and mortar (2002)
1200 A	: General (1986)
1200 AB	: Employer's Agent's office (1986)
1200 C	: Site clearance (1980)
1200 D	: Earthworks (1988)
1200 DB	: Earthworks (Pipe trenches) (1989)

1200 DK : Gabions and Pitching (1996)
1200 G : Concrete (Structural) (1982)
1200 GA : Concrete (Small works) (1982)
1200 GE : Precast Concrete (1984)
1200 L : Medium-pressure pipe lines (1983)
1200 LB : Bedding (Pipes) (1983)
1200 LC : Cable ducts (1981)
1200 LF : Erf connection (water) (1983)
1200 LG : Pipe jacking (1983)
1200 DM : Earthworks (Roads,Subgrade) (1981)
1200 LD : Sewers (1982)
1491-1 : Portland cement extenders Part 1: Ground granulated blast-furnace slag (2005)
1491-2 : Portland cement extenders Part 2: Fly ash (2005)
1491-3 : Portland cement extenders Part 3: Silica fume (2005)
1882 : Polymer concrete surface boxes, manhole and inspection covers, gully gratings and frames (2003)
50197-1/ EN 197-1 : Cement - Part 1: Composition, specifications and conformity criteria for common cement
5831 : Presence of chlorides in aggregates
5861-2 : Concrete tests - Sampling of freshly mixed concrete (2006)
5862-1 : Concrete tests - Consistence of freshly mixed concrete - Slump test (2006)
5863 : Concrete tests - Compressive strength of hardened concrete (2006)
5864 : Concrete tests - Compressive strength of hardened concrete (2006)
5865 : Concrete tests - The drilling, preparation, and testing for compressive strength of cores taken from hardened concrete (1994)
0268-1 : Welding of thermoplastics – Welding Processes
1476:2009 : Fabricated flanged steel pipework

Reference is made to certain provisions of:

SANS 1921-5 Construction and management requirements for works contracts: Earthworks activities which are to be performed by hand
SANS 1914-5 Targeted construction procurement: Participation of targeted labour

All the above specifications are not issued with this volume but are available at the Contractor's expense from: Standards South Africa,

These Specifications are not issued with this volume but are available at the Contractor's expense from Standards South Africa:

Physical Address	Postal Address	Telephone No.	Fax No.	Email Address

1 Dr Lategan Road, Groenkloof PRETORIA	Private Bag X191 PRETORIA 0001	012 428-7911	012 344 1568	sales@sabs.co.za

For "Workmen's Compensation Act" read "Compensation for Occupational Injuries and Diseases Act, 1993 (Act No.130 of 1993)" wherever it appears. For "Machinery and Occupational Safety Act" and "Mines and Works Act" read "Occupational Health and Safety Act, 1993 (Act 85 of 1993)" wherever they appear. For "maintenance period" read "Defects Liability Period in terms of Clause 1.1.1.13 of the General Conditions of Contract, 2010" wherever it appears

PS4.1.3 Other Standards

Other Standard Specifications applicable to this Contract shall be:

a) ASTM C.309 Type 1 (Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete).
b) WRC MSCC.
c) City of Johannesburg Metropolitan Municipality, Public Road and Miscellaneous By-laws, Code of Practice for work in the road reserve (COP), Latest Version. ***NOTA BENE**: Should any requirement of this COP conflict with any requirement of the standardised or particular specifications the requirements of the COP shall prevail.* The COP is available at Johannesburg Roads Agency Offices, Wayleaves Department, Contact number: (011) 298 5000.

PS4.2 Particular generic specifications

PS4.2.1 Minimum health and safety requirements

This section of the specifications is to be read in conjunction with the Contract Health and Safety specifications, included as Volume 2. The following requirements shall be deemed minimum compliance requirements to ensure the health and safety of the public and workers during the execution of the Contract:

PS4.2.1.1 Road safety equipment

The internal conduit survey unit shall be provided with:

a) an amber-flashing beacon, which shall comply with and be operated in accordance with any governing road vehicle lighting regulations or similar.

b) appropriate sized and quantity of road signs, including delineators and cones which shall be displayed at the works area in accordance with safety regulations or similar.
c) bright coloured overalls, fluorescent over-jackets and belts for each team member for use at all working times during the day or night.

PS4.2.1.2 Personal safety equipment

The internal conduit inspection unit shall be provided with:

a) oxygen deficiency and gas detector apparatus, which shall be regularly serviced and operable.

b) fresh air breathing apparatus, face mask and demand value, with a sufficient minimum compressed air supply, determined by the duration of manhole and/or conduit entry.

c) an approved full vertical lift safety harness.

d) personal equipment per member:
   i) safety helmet;
   ii) safety boots;
   iii) sewer wading boots; and
   iv) disposable protective gloves.
   v) Cloth Musk (Tripple layer) or Surgical

e) First Aid Kit suitable to cater for the number of team members.

f) facilities for washing, including:
   i) soft soap;
   ii) disinfectant; and
   iii) clean water.
   iv) Hand sanitizer (70% alcohol based)

g) radio equipment and cellular phone for on site and emergency communication.

h) fire extinguisher.

PS4.2.2 Traffic control

a) A traffic control plan shall include detailed diagrams showing the location of all traffic control devices and the length of time for all lane closures, as well as location of any flaggers, as necessary.
b) One lane of traffic in each direction must be maintained at all times and local streets may only be closed with prior approval of the Employer's Agent.
c) A written method of handling traffic for each different phase of the project shall be submitted and include both vehicular and pedestrian traffic.
d) The name and number of the Contractor representative responsible for traffic control shall be made available to solve traffic problems at each job site location.

PS4.2.3 Metric measurement

All survey recorded dimensions of infrastructure shall be in metric units, including for conduits, chambers and manholes.

PS4.2.4 Site preparation

Prior to any Works commencement the Contractor shall photograph or video tape entire work area. One copy of which shall be given to the Employer's Agent's authorized representative and one copy shall remain with the Contractor for a period of 12 months following the issue of a Completion Certificate. This record shall be used to establish accountability for damages during the execution of the Contract.

No alterations beyond what is required for Works are to be made. Contractor shall confine all activities to designated work areas, to the absolute minimum required.

PS4.2.5 Pipe handling and storage

Pipe shall be handled and stored in accordance with safe lifting practice. The lifting capacity of the equipment shall not be exceeded.

Where slings are used for lifting

a) timber, timber wedges or sandbags. Pipes shall be placed on timber bearers not more than 1.5m apart. Where pipes are stacked, timber bearers shall be placed between each layer of pipes.

b) Plastic pipes shall be stored away from contact with chemicals or ground contaminated with chemicals.

c) Care shall be taken to prevent scoring and scratching of plastic pipes.

d) Rubber rings for pipe joints shall be stored in a cool area, preferably 20°C or less and away from direct sunlight. They shall be protected to ensure that there is no contact with petroleum products. Styrene butadiene rubber rings shall also be stored away from sources of ozone such as fluorescent lights and electric motors.

PS4.2.6 Inspection of pipes and fittings

Pipeline rehabilitation components shall be checked for damage and flaws immediately before installation, where:

a) plastic pipes and fittings shall be checked for gouges, cracks, holes, flattening and indentations.
b) rubber rings shall be checked for tears or any other damage or flaws before making each joint.
c) concrete pipes shall be checked for cracks or any other damages flaws before making each joint

Damaged or flawed pipes and fittings can only be used if approved by the Employer's Agent. Pipes and fittings considered unsuitable for use by the Employer's Agent shall be removed from the site at the Contractor's expense. The Employer's Agent may approve

the repair of any damage where the pipe or joint may be repaired without affecting its performance.

PS4.2.7 Cutting of pipes

Pipes shall at all times be cut square to the barrel of the pipe. For:

a) rubber ring and solvent cement jointed pipe, the deviation from square shall not be in excess of 5mm.
b) butt or electro-fusion jointed PE pipes the deviation from square shall not be in excess of 1mm.

Jagged edges shall be removed from pipe ends. Cut edges of rubber ring or solvent cemented plastic pipes shall be bevelled in accordance with the manufacturer's instructions.

PS4.2.8 Acceptability of damaged pipe

Cuts or gouges that reduce the pipe wall thickness in excess of 10% is not acceptable and shall be cut out and discarded.

PS4.2.9 Pipe joining

PS4.2.9.1 Fusion butt-welding

a) Interpretation
This section shall cover the butt-welding plastic pipes, which shall involve the heating of two pipe ends to fusion temperature and then subsequently joining the two ends by the application of force.

b) Equipment
The basic parts of the equipment shall be:
i) Planing Tool: used to face pipe ends.
ii) Heating Plate: used to melt pipe ends
iii) Frame: holds on to the pipes to be joined. It has hydraulic cylinders which apply pressure to the pipe joints.
iv) Hydraulic unit: has the hydraulic pump, tank, pressure gauges, directional valves, pressure regulation valves.
v) Data logger: records pertinent process data such as time, pressure and temperature. The data logger ensures that every joint is made properly.

c) Site preparation

The technician shall ensure that the machine is situated in a dry area, before welding is commenced. The equipment shall not be exposed to rain.

No welding shall be executed during rain, unless an outdoor roofing structure is provided to protect the equipment and process from rain. The technician shall ensure that the equipment does not sit on wet ground.

d) Pipe preparation
Pipe ends to be joined shall be dry and free from foreign particles.

PS4.2.9.2 Restrained joint couplings

a) Pipe may be joined using nonmetallic restrained type couplings. Pipe and couplings shall be designed as an integral system and shall be provided by a single manufacturer for maximum reliability and interchangeability. No external pipe-to-pipe restraining devices that clamp onto or otherwise damage the pipe surface as a result of point-loading shall be permitted.

b) Couplings shall be designed as minimum for use at the rated pressures of the pipe with which they are utilized.

PS4.2.10 Launch and reception pits

The required launch and receipt pits for pipe cracking shall be excavated and maintained to minimum dimensions. Said excavations shall be adequately barricaded, shored, braced and dewatered, as required, in accordance with the applicable portions of these specifications, including:

a) Excavation adjacent to the road pavement shall be performed in a manner to adequately support these facilities.
b) Pipe entry and receiving areas to provide a gradual entry of the pipe without stress to the pipe or joints and to allow free movement into the hole at an acceptable depth.
a) Where possible, with regard to size and structural integrity, associated structures are to be utilised for pits for pipe cracking equipment. Alternatively, pits are to be located where possible at property connections OR branch connections OR identified localised repairs positions.
b) Where approved by the Employer's Agent, channelling and walls of existing associated structures may be altered by the Contractor to insert and receive pipes during operations. Where a continuous length of pipe is to be towed in, such as pipe lengths welded together or a coiled pipe, the launch pit shall be of a size to permit insertion of the continuous pipe length without bending to a smaller radius of curvature than permissible by the manufacturer.
c) Where a continuous pipe length is to be used, the top of the pipe length to be inserted shall be protected from damage at the entry. The Employer's Agent shall approve the method of protection.
d) Pits shall be reinstated and cleared of all plant, material and debris prior to moving to other sites.

PS4.2.11 No surface disturbance

Pipes installed by means of bursting or pipe cracking shall be in a manner that does not cause upheaval, settlement, cracking, movement or distortion of surface features.
Contractor to maintain close observation to detect any settlement or displacement of surface and/or adjacent facilities: In the event of settlement or displacement the

Contractor is to notify the Employer's Agent immediately, whilst maintaining safe conditions and prevent any further damage from occurring.

PS4.2.12 Damage to services or structures

The Contractor shall satisfy the Employer's Agent that pipe cracking operations shall not have a detrimental effect on adjacent services or structures.
Where the Employer's Agent determines that services adjacent to the existing pipe shall be damaged by pipe cracking, such services shall be exposed and protected.
Services or structures identified by the Employer's Agent, as being damaged by pipe cracking operations shall be repaired at the Contractor's expense.

PS4.2.13 Encountering of water during operations

The Contractor is to provide and maintain a water removal system that has sufficient capacity to remove all encountered water, during operation, in particular during pipe cracking. Such system(s) shall ensure that soil particle removal is kept at a minimum.

PS4.2.14 Site restoration

Following all Works completion, the Contractor shall disassemble all equipment and restore the site to original condition. Any noticeable surface defects, due to the executed Works, shall be repaired by the Contractor.

All excavations shall be backfilled and compacted to minimum density of 95% MOD ASSHTO, unless otherwise instructed by the Employer's Agent.

PS4.2.15 Assess and record pipe infrastructure

Evaluating the condition of sewer infrastructure is important in order to facilitate educated decisions on scheduling required rehabilitation or the next survey. Thus, surveyed infrastructure is to be compared to their observed structural and functional integrity, from the best condition just after installation, to the worst condition just before rehabilitation work is required. Assessment and recording shall include, but not be limited to:

a) size, material type, and depth of each infrastructure, referenced from the top of the manhole frame to the invert of the sewer conduit;
b) structural condition of walls;
c) condition of conduit joints, and lateral connections;
d) explanations for water level fluctuations;
e) any blockage or obstructions located within the infrastructure;
f) infiltration; and
g) photographic prints shall be taken of sewer infrastructure, highlighting all significant structural and/or operational deficiencies.

PS4.2.16 Conduit cleaning
PS4.2.16.1 Objective of cleaning

The objective of cleaning the sewers shall be to expose the fabric of the conduit by removing the silt, grease and debris so that it can function properly or an accurate assessment of its condition can be made by means of CCTV surveying.

The Contractor shall note that:

a) certain conduits may not require excessive cleaning before the CCTV survey, however all sewer pipes where CCTV surveying is to be conducted under this Contract shall be cleaned by high pressure water jetting or other methods as agreed with the Employer's Agent or his duly authorized representative.

b) During cleaning of pipelines, the flow of sewage shall be maintained by over-pumping.

c) On completion of the cleaning, the Contractor shall ensure that all his equipment, debris, silt and grease are removed from the conduit and that each conduit is cleaned and free of any foreign obstruction to ensure free flowing of the sewage.

PS4.2.16.2 Working site

a) The workspace required to successfully clean conduits shall be kept at a minimum. Thus, plant and equipment not used is to be removed from the work site to minimize disruption to traffic and the general public.

b) The working area is to be free of debris when the Contractor leaves the site at the end of each shift.

c) Open manholes, machinery and standing equipment are to be protected to ensure the safety and convenience of traffic, the general public or other at all times.

PS4.2.16.3 Cleaning units

The Contractor shall provide:

a) sufficiently suitable cleaning units, of adequate capacity, in good condition, including standby unit(s) in the event of breakdown, in order to complete the works within the allocated shift and ultimately within the Contract Period.

b) cleaning units capable of operating up to 200m from the point of access to the conduit.

c) only units that comply with the safety requirements as detailed in his approved health and safety plan.

d) only cleaning equipment that has been approved by the Employer's Agent or his duly authorised representative.

PS4.2.16.4 Operational requirements

The Contractor shall provide cleaning units that:

a) carry a sufficient number of guides and rollers, such that when cleaning, all bends are supported away from conduits and manhole structures.

b) shall be operated in such a manner to prevent sewer overflows. Where flows in the conduit are such that the overflow shall occur during the cleaning operations, the Contractor shall make arrangements to prevent the premature overflow or stop operations until such flows are reduced to allow cleaning to continue.

c) have a system of silt, grease and debris removal, capable of operating in such a manner as to minimise the obstruction to pipeline flow and the cleaning operations.

PS4.2.16.5 Arising

The Contractor shall:

a) remove all silt, grease, debris, detritus, litter deposits, bricks, rocks, etc (herein referred to as arisings) that is lodged in the lengths of the conduit required to be surveyed or repaired or as otherwise directed by the Employer's Agent or his duly authorised representative. Such material shall be caught and collected in a trap located at the manhole from where the conduit is being cleaned.

b) deposit all arisings in a suitable closed container, of a type and capacity as he deems necessary to comply with the health and safety requirements and the Contract Period.

c) programme the works in such a manner that the cleaning operations are not delayed through a lack of an empty container in which arisings are to be deposited.

d) bear in mind that it may not always be possible for the container to be sited immediately adjacent to the manhole from which arisings are being removed and should allow for the fact that 'double handling' of arising may be necessary. Double handling shall be executed in a safe and efficient manner.

e) make his own arrangements for the disposal of arisings, but shall dispose of such arising in a manner that is safe and efficient in the opinion of the Employer's Agent or his duly authorised representative.

f) if pre-installation inspection reveals an obstruction such as a protruding service connection, dropped joint, or a collapse that may prevent the installation process and it cannot be removed by conventional pipe cleaning equipment, then the Contractor shall make a localized "point" repair excavation to uncover and remove or repair the obstruction. Such excavation shall be approved in writing by the Employer's Agent's representative prior to the commencement of the work.

PS4.2.16.6 Winching equipment

The Contractor shall:

a) provide conventional power winching equipment, approved by the Employer's Agent or his duly authorised representative, with ancillary equipment, winching buckets, breakers, scrapers, tools and safety apparatus for cleaning conduits.

b) undertake dredging of conduits by passing various sized buckets through the pipeline to physically remove accumulated arisings. The maximum size of the winch bucket used shall be a diameter of 90% that of the conduit up to a maximum of 600mm. However, the Contractor shall:

i) note that as a result of the sizes of the manhole covers and access restrictions that the afore-mentioned maximum bucket size may not always be practical.

ii) ensure his working procedure shall not be unduly affected by such restrictions.

c) incorporate torque limiting device in winches to prevent the breaking of winching lines in the event of the line becoming jammed by obstructions in the conduit.

d) ensure that all winches are stable with either lockable or ratcheted drums, where operational equipment is towed by winch and bound through the conduit. All:

i) bonds shall be steel or an equally non-elastic material to ensure smooth and steady progress of the equipment.

ii) winches shall inherently be stable under loaded conditions.

e) provide power boring equipment and/or winching equipment including cables, lines, props and tools where conditions dictate.

f) provide equipment capable of operating efficiently in the conduit sizes stated and manhole lengths pipelines up to distances of 200m between adjacent manholes.

g) be prepared at all times to use push rods, mechanical boring equipment or other methods to pass a leading line through the conduit prior to commencing dredging operations with the winching equipment, should flows be full or in surcharged condition.

h) work in such a manner that excessive quantities of arisings are not allowed to pass downstream from any section of the manhole length being cleaned, necessitating the cleaning of such section. Should this occur, as a result of negligence on the part of the Contractor, the cost to clean the additional section of pipeline or re-cleaning of an already cleaned section shall be at the expense of the Contractor.

i) generally ensure that dredging operations in a particular section of sewer proceed in a downstream direction.

j) ensure that any item of plant or equipment associated with the work which may cause obstruction to the flow in the drain is removed from the pipeline at the end of operations or at meal breaks each day. However, the Contractor

shall be allowed to leave a line or winching cable through the pipeline during temporary breaks in the operations.

k) demonstrate the successful cleaning of conduits by means of the CCTV survey.

PS4.2.16.7 Pressure jetting equipment

a) The Contractor shall ensure that the equipment used is sufficient for the purpose of attaining the degree of cleanliness required to facilitate a successful CCTV survey or sewer operations. The Contractor shall take due care to avoid structural damage to the conduit during cleaning operations. Thus, he shall adhere to the following minimum criteria:

i) work from downstream manhole, unless otherwise authorised by the Employer's Agent or his duly authorised representative.

ii) do not exceed maximum holding/stationary time of 60 seconds of nozzle.

iii) adhere to the following minimum flow rates for applicable pipeline diameters:

Minimum flow rate (l/s)	Maximum recommended conduit diameter (mm)
0.4	225
1.5	450
3.0	900
4.5	1000

iv) adhere to the following pump pressure that shall be applied to conduits with the following properties:

Structural Condition*	Conduit material	Maximum pump pressure (bar)
1,2	Pitch fibre, brick masonry	100
1,2	Plastic (PE, PP and PVC)	180
1,2	Asbestos cement, clay, concrete	340
3	Pitch fibre, brick masonry	100
3	Plastic CPE, PP, PVC, asbestos cement, clay concrete	130
4,5	All	80

Note *: Structural grading is in accordance with the Sewer Rehabilitation Manual, WRC (2004)

b) The jetting unit shall be capable of jetting a minimum distance of 100m either upstream or downstream from a manhole, with a nominal hose size of 25mm diameter.

c) Successive passes using the pressure jetting technique shall be used with the silt removed at manholes until such time that the conduit is clean.

d) Pass rates for the jetting head shall be at a consistent speed avoiding jerking and excessive variations. Typical pass rates being 100mm to 200mm/second. The hose reel shall be power driven in the rewind directions.

e) The Employer's Agent or his duly authorised representative shall approve the jetting equipment proposed to be used by the Contractor, which shall be categorised from:

Category	Machine type	Capacity (liters/minute) Min - Max	Pressure* (Bar) Min - Max
1	High pressure/ low volume trailers	41 – 155	210 – 700
2	High pressure/ low volume – mini	41 – 155	210 – 700
3	High pressure / high low volume – non-HGV/HGV jetter/ combination	38 – 160	210 – 350
4	Low pressure / high volume – HGV	113 – 213	103 – 138
5	Low pressure/ high volume – combination	110 – 380	120 – 210
6	Low pressure / high volume – super combination	340 – 770	138 – 180
7	Low pressure/ high volume – separate jumbo jetter/ suction units	340 – 700	137 – 170

Note *: Maximum operating pressure for nozzles other than pencil type jets shall not exceed 340bar
***NOTA BENE**: The Employer typically uses jetting equipment with 120 bar pressure and 300 litres/minute*

f) Jetting units fitted with an airflow suction unit for removal of accumulations from the conduit, shall be capable of removing materials such as sludge, silt and bricks from depths up to 10m with a minimum suction of 70m^3/minute. A tank with minimum capacity of 5m^3 shall be provided by the Contractor and be capable of decanting collected fluids back to the conduit. The suction hose of such system shall have a minimum internal diameter of 150mm.

g) Jetting equipment shall be calibrated prior to works on site by an approved body or a party such as the supplier, and the Contractor shall provide calibration

certificates made available for inspection by the Employer's Agent or his duly authorised representative.

h) Equipment, in particular the nozzles and pressure relief valves, shall also be maintained on a regular basis in accordance with the manufacturer's specifications. The Contractor shall make available to the Employer's Agent or his duly authorised representative on a monthly basis, copies of his maintenance certificates and/or schedules.

i) An automatic pressure relief valve shall be incorporated on the pump discharge chamber to prevent the pressure exceeding the safe maximum for the whole system. This may take the form of:
i) a pressure relief valve or bursting disc in holder; or
ii) an automatic pressure regulating valve (unloading valve).

PS4.2.17 Internal pipe CCTV surveying

PS4.2.17.1 CCTV equipment

A CCTV survey shall be performed on all laid sewer pipes.

The Contractor's CCTV equipment, at minimum, shall:

a) be capable of surveying a minimum continuous conduit length up to 350m where entry to the pipe is obtained at each end, or up to 150m where a self-propelled unit is used where entry is at one end only.

b) be a complete range of CCTV survey equipment to enable surveying of difficult locations such as steep slopes and sewer backdrops to be surveyed under safe working conditions.

c) use colour cameras with pan and rotate heads with forward and side viewing capabilities, to enable the internal conditions of junctions and connections to the conduit to be surveyed closely.

d) contain a means of transporting the CCTV camera in a stable condition through the conduit being surveyed. Such equipment shall ensure the maintained location of the CCTV camera on or near to the central axis of the conduit.

e) where the CCTV camera is towed by a winch and bond through the conduit, have stable winches with either lockable or ratcheted drums. All bonds shall be steel or of an equally non-elastic material to ensure the smooth and steady progress of the CCTV camera. All winches shall be inherently stable under loaded conditions.

f) carry sufficient numbers of guides and rollers such that, when surveying, all bonds are supported away from the conduit and manhole structures and all CCTV cables and/or lines used to measure the camera's location within the conduit are maintained in a taut manner and set at right angles, where possible, to run through or over the measuring equipment.

g) be maintained in full working condition and shall satisfy the Employer's Agent or his duly authorised representative at the commencement of each working shift that all equipment items have been provided and are in full working

condition and fully calibrated in accordance with the manufacturer's recommendation.

PS4.2.17.2 Camera position

The Contractor shall ensure:

a) wherever prevailing conditions allow, that the camera shall be positioned to reduce the risk of picture distortion. The camera lens shall be positioned looking along the axis of the conduit. A positioning tolerance of +/-10% of the vertical conduit dimension shall be allowed. In addition, the camera shall be positioned so that the long side of the photograph is horizontal.

b) that when a photograph or video print is taken to illustrate a specific defect during the CCTV survey it may be necessary to relax the afore-mentioned requirements. Where a photograph print is taken to illustrate a specific defect, it shall occupy the central part of the photograph print and be clearly in focus and accurately reflect the defect. If necessary, a second photograph print shall be taken at the location to put the defect depicted in the specific photograph prints into perspective in the overall context of the pipe.

c) that photograph or video prints to illustrate the degree of mortar loss, size of a crack or fracture, size of a void or any other quantifiable defects shall include a suitable metric scale in the photograph, are clearly visible and in focus within the photograph or print.

PS4.2.17.3 Camera speed

The Contractor shall ensure that the:

a) speed of the CCTV camera in the conduit shall be limited to:

Conduit diameter	**Camera speed**
≤ 200mm	0.1m/s
> 200mm and ≤ 300mm	0.15m/s
> 300mm	0.2m/s

Alternatively, such other speed shall be allowed as agreed with the Employer's Agent or his duly authorised representative to enable all details to be extracted from the video recordings.

b) camera shall be 'stopped' for a few seconds to ensure that an accurate and clear record is taken whenever defects are being noted on the coding sheet.

PS4.2.17.4 Linear measurement

The Contractor shall ensure that:

a) the CCTV monitor display shall incorporate an automatically updated record in metres and tenths of a metre of the meterage of the camera position from the cable calibration point which shall be referred to as the 'adjusted zero'.

b) he utilises a suitable metering device which enables the cable length to be accurately measured, which shall be accurate to +/- 1% or 0.3m whichever is the greater. Testing of the cable shall be done before any works in a shift.

c) he demonstrates that the tolerance in the afore-mentioned sub-clause is being complied with using one or both of the following methods, where practical, in conjunction with a linear measurement audit form which shall be completed and submitted to the Employer's Agent or his duly authorised representative each day during the CCTV survey:
   i) use of a cable calibration device, and/or
   ii) tape measurement of the surface between manholes, centre-to-centre.

d) when requested by the Employer's Agent or his duly authorised representative in writing at any time during the course of the survey, he shall demonstrate that the above tolerance is being complied with. The device used by the Contractor to measure the distance along the conduit shall be compared with a standard tape measure and the results shall be noted. Where the Contractor fails to meet the required minimum standard of accuracy, the Employer's Agent or his duly authorised representative shall instruct him to:
   i) provide a new measuring device; and
   ii) re-survey those conduit lengths first inspected with the original measuring device recording inaccurate measurements using the new replacement measuring device, the cost of which shall be for the account of the Contractor.

PS4.2.17.5 Data display, video recording and start of survey

a) At the start of each manhole length being surveyed, the conduit length from zero chainage up to the cable calibration point shall be recorded and reported in order to obtain a full record of the conduit length.

   The meterage reading entered onto the data display at the cable calibration point must allow for the distance from the start of the survey to the cable calibration point such that the meterage at the start of the survey is zero.

   The survey team leader shall ensure that the meterage counter starts to register immediately when the camera commences the survey (thus to move).

b) At the start of each manhole length a data generator shall electronically generate and clearly display on the viewing monitor and video recording a record of data in alpha-numeric form containing the following minimum information:
   i) automatic update of the CCTV camera's meterage position in the conduit from 'adjusted zero';
   ii) conduit dimensions;
   iii) conduit classification (sewer, water, and stormwater drainage);
   iv) conduit material;
   v) manhole prescribed reference number;
   vi) direction of survey (upstream or downstream);
   vii) time of survey start;
   viii) road name or location;
   ix) date of survey; and
   x) name of qualified operator.

NOTA BENE: The size and position of the data display shall be such as not to interfere with the main subject of the recording picture.

c) Once the survey of the manhole length is under way, the following minimum information shall be continuously displayed and updated:
   i) automatic update of the CCTV camera's meterage position in the conduit from 'adjusted zero';
   ii) conduit dimension;
   iii) conduit material;
   iv) manhole length reference numbers; and
   v) direction of survey (upstream or downstream).

d) The Contractor shall demonstrate the:
   i) correct adjustment of the recording apparatus and monitor by use of the test tape or other device approved by the Employer's Agent or his duly authorised representative; and
   ii) demonstrate satisfactory performance of the camera by the recording of the appropriate test device at the commencement of each day for a minimum of 15 seconds.

e) All video recording media shall be:
   i) supplied by the Contractor;
   ii) the best suitable quality, new and unused prior to recording; and
   iii) of a DVD format, with a minimum running time to ensure that a full manhole length survey is always contained on a single DVD.

   The disc shall be usable on the same diameter platter as a CD, 120mm diameter.

f) CCTV survey video recordings shall also be convertible to CD-ROM digital formats.

PS4.2.17.6 CCTV picture quality

The Contractor shall:

a) ensure the CCTV camera shall have suitable illumination and shall be capable of providing an accurate and clear record of the conduit's internal conditions.

b) submit to the Employer's Agent or his duly authorised representative for approval a test device for the CCTV camera equipment and make available on site for the duration of the Contract Period, enabling all tests specified in this clause to be checked by the Employer's Agent or his duly authorised representative

The test card shall be Marconi Resolution Chart No. 1 or its derivatives with a colour bar, clearly differentiating between colour with no tinting to show white, yellow, cyan, green, magenta, red, blue and black.

At the start of each working shift, the camera shall be positioned centrally at right angles to the test card at a distance where the full test card just fills the monitor screen, ensuring that the edges of the test card's castellations coincide with the edges of the horizontal and vertical scan. The card shall be illuminated evenly and uniformly without any reflection. The illumination shall be to the same colour temperature as the colour temperature of the lighting that shall be

used on the CCTV camera in the conduit. The test shall be recorded, for at least 15 seconds, and submitted to the Employer's Agent or his duly authorised representative on a daily basis. The recording shall show the camera being introduced into the test device and reaching its stationary position.

The Contractor may, propose alternative test devices, for the approval by the Employer's Agent, that will yield at minimum the same or a better result.

c) ensure the electronic systems, television camera and monitor shall be of such quality as to enable the following to be achieved:

i) Shades of grey

They grey scale shall show equal changes in brightness ranging from black to white with a minimum of five clearly recognisable stages.

ii) Colour

By adjusting the monitor control for corrected saturation, the 6 colours plus black and white shall be clearly resolved with the primary and complementary colours in order of decreasing luminance. The grey scale shall appear in contrasting shades of grey with no tint.

iii) Linearity

The background grid shall show squares of equal size, without convergence over the whole of the picture. The centre circle shall appear round and have the correct height/width relationship (+/-5%).

iv) Resolution

The live picture must be clearly visible with no interference and capable of registering a minimum number of television lines or picture height lines. The resolution shall be checked by the Contractor with the colour monitor turned down. In the case of tube cameras this shall be 350 lines and in the case of CCD type cameras 250 lines.

v) Colour constancy

To ensure the camera shall provide similar results when used its own illumination source, the lighting shall be fixed in intensity prior to commencing the survey. In order to ensure colour constancy, generally no variation in illumination shall take place during the survey.

d) note that the Employer's Agent or his duly authorised representative may periodically check both the live and video picture colour consistency against the colour bar. Any differences shall necessitate re-survey of the affected conduit length(s) at the Contractor's expense.

e) ensure as little quality loss as possible by making certain that conversion and compression of footage shall be limited to only what is needed to provide the required product. The footage recorded shall be compressed only enough to ensure that the required picture quality is achieved. The image data shall not be compressed to, or recorded at a lower resolution/quality and subsequently resized to meet the required resolution/image size.

PS4.2.17.7 Video playback

Recording playback of CCTV camera surveys shall be capable of a minimum resolution of a 720x576 lines recorded at standard speed and be played back at a bit rate of minimum 6 Mbit/s and at 25 frames per second.

PS4.2.17.8 Focus or iris or illumination

The adjustment of focus and iris shall allow optimum picture quality to be achieved and shall be remotely operated. The adjustment of the focus and iris shall provide a minimum focus range of 150mm in front of the camera's lens to infinity. The distance along the conduit in focus from the initial point of observation shall be a minimum of twice the vertical height of the conduit. The illumination shall be such as to allow an even distribution of the light around the conduit perimeter without the loss of contrast, flare out picture or shadowing.

PS4.2.18 Photographs and video prints

PS4.2.18.1 Required photographs and video prints

Photographs and video prints shall be provided for:

a) water and sewer pipelines:
   i) all junctions and connections defective or otherwise (as defined in the WRC MSCC, including cracks, fractures, holes, broken conduits, deformation, collapse and severe joint displacement or open joints). **PRINTS AND PHOTOGRAPHS, where the latter is possible**
   ii) continuous defects, at the beginning of the defect thereafter at the 5m intervals. **PRINTS ONLY**
   iii) in addition to the requirements of sub-clauses PS4.2.21.3 (Camera position) video prints, at maximum 25m intervals for each manhole length as a record of the general condition of the pipeline. **PRINTS ONLY**

b) all manholes or chambers or pits: all junctions and connections and other appropriate features. **PRINTS AND PHOTOGRAPHS, where the latter is possible.**

PS4.2.18.2 Format

Photographs and CCTV video prints shall be provided on both electronic and hard copy format.

PS4.2.18.3 Quality and size

Photographs and CCTV video prints shall:

a) have high quality colour; and
b) be minimum 80X60mm in size, or as otherwise agreed with the Employer's Agent or his duly authorised representative.

PS4.2.18.4 Record of photographs and video prints

Photographs and video prints shall be supplied in hard copy format in card index files. All photographs or prints relating to a particular manhole length shall be kept together and in

order of chainage (prescribed interval) sequence. Each manhole length shall be clearly identified by inserting a divider (metal, cardboard or plastic). The divider shall have an annotation on the top face to show the start manhole number and the finish manhole number to the annotation specification laid out in sub-clause PS4.2.7.5 (Photographs and video print annotation). The annotation of the finish or start manhole shall be clearly visible when all photographs or prints are installed in the drawer. Each drawer shall contain approximately 20 photographs or prints; however, every effort shall be made to ensure that a complete manhole length's photographs or prints is always filed together.

PS4.2.18.5 Photographs and video print annotation

An annotation shall be provided on all issued photographs and video prints that shall:

a) clearly identify the location (manhole reference), survey direction, chainage (in relation to the referenced manhole), print number and date;
b) be clearly visible and in contrast to its background;
c) have black type-printed Arial-type font with a size no greater than 5mm; and
d) not interfere with the subject of the photograph or print.

PS4.2.19 CCTV camera operator qualifications

ONLY CCTV camera operators who have successfully attained the appropriate qualification, such as the WRC Level of Qualification for CCTV Operators or have completed an accepted alternate recognised training program shall be permitted to operate inspection equipment. A valid copy of the WRC Operators Certificate for each operator shall be submitted to the Employer's Agent at least 10 days before commencement of the CCTV survey parts of the works.

Where no recognized qualification authority exists to facilitate such training and accreditation the Contractor shall provide conclusive proof that the proposed operator has minimum of 5 years of successful experience, having successfully completed at least 100km of water and sewer pipe surveys, in all aspects of water and sewer survey and capable of making accurate observations and recording all conditions that may be encountered in the water and sewer pipes.

PS4.2.20 Picture quality, camera, video recorder and monitor

The Contractor shall provide the test device(s) to enable practical demonstration of the quality of the video recordings, video prints and photographs that shall be provided for the duration of the Contract Period. Test devices for cameras shall utilise the Marconi Resolution Chart No.1 or its derivatives, or such device as may be approved by the Employer's Agent or his duly authorised representative.

PS4.2.21 Condition grading

Evaluating the rate of conduit deterioration is important in order to facilitate educated decisions on scheduling required rehabilitation or the next survey. Thus, surveyed conduits are to be assigned condition grades according to their observed structural and functional integrity, from the best condition just after installation, to the worst condition just before rehabilitation work is required.

The Contractor shall be required through the use of CCTV cameras to video survey, record and assess the condition of water and sewer conduits according to WRC defect coding standards contained in the MSCC, including but not limited to:

a) structural condition of conduit walls. Length, size, material type, and depth of each conduits (all depths) shall be referenced from the top of the manhole frame to the invert of the conduit being inspected;
b) any blockage or obstructions located within the conduit;
c) condition of conduit joints, and lateral connections;
d) any change in conduit diameter or conduit materials encountered in the manhole length;
e) report on grade of conduit as to whether it is uniform or whether there appears to be sectional settlement or grade changes;
f) infiltration;
g) explanations for water level fluctuations;
h) location and condition of property connections, **including pan and tilt of all junctions/connections** unless otherwise specified by the Employer's Agent or his duly authorized representative; and
i) video prints shall be taken of all significant structural and/or operational deficiencies.

PS4.2.22 Water infiltration measurement

Where water infiltration is identified during the internal conduit survey process the Contractor shall measure infiltration, while the block or bypass is still in place, by:

a) isolating the sewer section using an appropriate sized weir.
b) stabilizing the rate of flow through the weir for 10 minutes before taking measurement.

The Contractor shall formally report the measurements to Employer's Agent or his duly authorized representative upon inspection completion.

PS4.2.23 Manhole repair and/or rehabilitation

PS4.2.23.1 Invert protection

The manhole invert shall be covered during repair and/or rehabilitation operations to prevent loose materials from collecting in the invert and flowing in the water and sewer conduit.

PS4.2.23.2 Surface preparation

Prior to any work inside of a manhole, all interior walls and invert and benching surfaces shall be cleaned, using a minimum 600Bar water blast to remove all foreign matter and loose material. If all deposits have not been removed, a 10% solution of hydrochloric (muriatic) acid shall be applied by spraying from above the manhole. Manholes treated with acid solutions shall be thoroughly flushed and allowed to dry. The mixing, application,

and removal of the acid solution shall be in strict accordance with the manufacturers' specifications and recommendations. *All safety procedures and protective devices applicable to the handling of the acid shall be strictly adhered to*.

PS4.2.23.3 Steps

Manhole step repair shall include, as directed by the Employer's Agent or his duly authorised representative:

- re-securing existing steps, where such is loose and still in a proper condition; and
- replacing missing or damaged steps.

The Contractor shall remove the existing steps where required, drill the necessary holes and perform all other work to install and anchor the repaired and/or replacement steps. Where applicable, the metal portion of any replaced steps shall be removed completely.

PS4.2.23.4 Manhole bottom repair and/or rehabilitation

The flow channel shall be checked for leaks, cracks, spalls or other discrepancies by plugging the upstream side and visually inspecting the channel. If additional benching or invert repairs are identified and deemed necessary, repairs shall be made so as to make the surface smooth and provide smooth flow through the manhole.

Bottom repair and/or rehabilitation shall include the replacement of the channel, with only earthenware or a similar approved quality product, and patching of the invert and benching areas in the manholes using a single component, ready to use with water, quick set, high strength polymer modified cementitious patching mortar for horizontal and vertical repair of concrete and masonry under water. Minimum physical properties of such component shall include:

Compressive Strength	1 day	>19 MPa
	7 day	> 31 MPa
	28 day	> 40 MPa
Flexural Strength	1 day	> 4 MPa
	7 day	> 5 MPa
	28 day	> 6 MPa
Slant Shear Bond Strength	7 day	> 8 MPa
	28 day	> 11 MPa

Note: No epoxy used.

The invert shall have a minimum depth through the manhole equal to ½ the diameter of the water and sewer conduit, with the bench sloping upward toward the manhole walls at 10%. All loose and deteriorated material shall be removed from the work site and properly disposed of by the Contractor.

PS4.2.23.5 Stopping active manhole wall leaks

Manhole wall repair shall include the sealing of all leaks (visible or non-visible to the eye) in the manhole. Wherever heavy liquid infiltration is present due to high ground water and which cannot be reasonably stopped, 15mm diameter holes shall be drilled at adequate

intervals around the base of the manhole wall to relieve outside pressure. All pressure leaks shall be sealed with a rapid setting material that bonds both mechanically and chemically to saturated surfaces. This compound shall:

a) be capable of setting in approximately 45 to 90 seconds;
b) be a fast setting plug to stop flowing water in masonry and concrete;
c) be a single component, expanding, polymer modified hydraulic cement based formulation;
d) plug and stop water under pressure, or slow seeping water through openings in masonry or concrete; and
e) maintain a positive volume and become a permanent part of the surface in which it is embedded.

Minimum physical properties of such component shall include:

Compressive Strength	Obtains 50% of strength in just over 24 hours Final compressive strength > 34.5 MPa
Tensile Strength	Final tensile strength > 2 MPa
Length Change	0%

Once the walls have been rehabilitated, the drilled holes shall be plugged with a cementitious compound, a mixture of a liquid admixture and cement capable of producing an extremely rapid setting plastic material capable of stopping pressure leaks in concrete and masonry structures.

PS4.2.23.6 Surface stabilisation of concrete manholes (where necessary)

Once all infiltration of water has been stopped on a concrete manhole and there is evidence of deteriorating concrete, a clear, odourless, inorganic liquid polymer shall be applied to the entire manhole surface for impregnating and hardening the surface. The polymer shall be applied to a clean, dry, sound surface and in accordance with manufacturer's directions.

PS4.2.23.7 Patching masonry walls

Patching of manhole walls shall be required in areas where large voids exist including missing bricks, cracks, spalls in manhole walls, around steps, frames, conduits and mortar joints. All cracked or disintegrated material shall be removed from the area to be patched exposing a clean, sound substrate. Under no circumstances shall water plug type materials be used for general patching. Patching shall be with a single component, ready to use with water, quick set, high strength polymer modified cementitious patching mortar for horizontal and vertical repair of concrete and masonry under water. Minimum physical properties of such component shall include:

Compressive Strength	1 day	>19 MPa
	7 day	> 31 MPa
	28 day	> 40 MPa

Flexural Strength	1 day	> 4 MPa
	7 day	> 5 MPa
	28 day	> 6 MPa
Slant Shear Bond Strength	7 day	> 8 MPa
	28 day	> 11 MPa

Note: No epoxy used.

PS4.2.23.8 Manhole waterproofing

Where so required the Contractor shall waterproof the complete sewer manhole either through a brush or spray application.
The waterproofing product/agent shall:

a) be a repair mortar for applications requiring additional tensile strength or where shrinkage crack control is warranted;
b) be inorganic;
c) have nylon fibers;
d) produce the highest quality mortar for spray or manual application in appropriate thick sections; and
e) be designed for negative side and positive side waterproofing applications.

The waterproofing system shall be applied from the invert to manhole frame to a dampened substrate.

PS4.2.23.9 Manhole frame and cover repair or replacement

Leakage is common with manhole frames and covers, in particular with super-imposed stormwater drainage conduit, including water entering through the holes in the cover, through the space between the cover and the frame, and subsurface water entering under the manhole frame.

All existing manholes shall be assessed for water tightness at the frame and cover. Where required the frame and cover shall be sealed by either:

a) replacing such with new watertight frame and cover, including:
   i) removal and disposal of the existing frame and cover;
   ii) adjustment bricks, blocks and mortar; and
   iii) inserting and leveling new frame and cover per the standard detail drawings.
b) sealing existing covers through the use of rubber cover gaskets and rubber vent and pick holes plugs; or
c) installing watertight inserts under the existing manhole covers, where the selection of watertight inserts (plastic, fibreglass, stainless steel) must consider installation condition's (non-traffic or heavy traffic) effect on the required strength and durability of the insert.

PS4.2.23.10 Partial reconstruction of manholes

Reconstructing of manhole shall consist of the work necessary to:

a) bring the manhole frame and cover to grade, where concrete sections or layers of brickwork must be removed for lowering or added for raising/lifting;
b) reconstruct a portion of the manhole as specified with no change in line or grade; and
c) tap one or more additional pipes into an existing manhole.

PS4.2.23.11 Structure connections

All conduits to structure connections shall be watertight, in particular for sewer systems. Thus:

a) conduit barrel at the spring line shall not extend more than 25mm beyond the inside face of structure.
b) to maintain flexibility in the connection, a 25mm space shall be left between the end of the conduit inside the manhole and the concrete channel; this space shall be filled with waterproof flexible joint filler, as specified in sub-clause PS4.2.27.5 (*Stopping active manhole wall leaks*)
c) the connection, to ensure a proper bond between the replacement pipe and the structure, sealing shall be extended for a minimum of 200mm into the structure wall in such a manner as to form a smooth, watertight joint.

PS4.2.24 Manhole appurtenances

PS4.2.24.1 Frames and covers

Manhole frames and covers shall conform to the applicable standard SANS 558 requirements, however such covers and frames shall:

a) be black iron castings for sewer;
b) be for the appropriate duty (for the installation location; i.e. light, medium and heavy) watertight type and bolt-hinged lid as noted on the standard detail drawings;
c) have a cover and seat that shall have machined bearing surfaces to prevent rocking and rattling;
d) have the Employer's brand (logo only) cast on;
e) be solid; and
f) have a concealed pick hole for all water and sewer manholes.

PS4.2.24.2 Manhole step irons

Manhole step irons shall conform to the applicable standard SANS requirements, but shall be:

a) spaced at 300mm centres;
b) distanced not exceed 600mm between the top of casting and the first step; and
c) plastic or similar approved.

PS4.2.25 Manhole bedding

a) Precast Manholes

Precast manhole bases shall be bedded on granular material or acceptable undisturbed foundation material.

b) Cast-in-place manholes
Concrete bases shall be poured on granular material or acceptable undisturbed foundation material.

PS4.2.26 Watertight testing

Water and sewer manholes shall be watertight structures, including any repair or rehabilitation portions. On completion of all manhole repairs and/or rehabilitations and proper elapsed curing time for the waterproofing materials, the manholes shall be visually inspected. The inspection shall be performed at the discretion of the Employer's Agent or his duly authorised representative during the warranty period following a rainfall sufficient to increase the flow in super-imposed stormwater drainage and raise the ground water table above the problem areas. All leakage problems determined by this inspection shall be corrected by the Contractor within an agreed upon time, to the satisfaction of the Employer's Agent or his duly authorised representative, at no additional cost.

PS4.2.26.1 Preparation of host pipe

a) The host pipe shall be cleaned of all arising as specified in clause PS4.2.20 (*Conduit cleaning*)

b) Where property connections are protruding into the host pipe, and in the opinion of the Employer's Agent may result in damage to the liner or obstruct free flow in the pipe post liner installation, the Contractor shall correct such protrusion(s) by means of methods specified in clause PS4.2.31 (*Localized pipe replacement or repair*) before the liner is installed.

c) Flow from property connections shall be temporarily backed up as specified in clause PS4.2.19 (*Pipe length isolation*) during installation and curing processes. Where property connection flows cannot be temporarily backed up (due to excessive flows), provisions shall be made for bypassing the property connections via over-pumping or other methods as specified by the Employer's Agent.

d) Prior to installation of the liner a protective bottom guard shall be inserted in the host pipe in order to facilitate easy installation of the liner whilst also providing protection of the liner from any damages during the installation.

PS4.2.26.2 Reconnection of property and branch connections and backdrops

a) Property connections shall not to be out of service for more than 8 hours, unless otherwise agreed in writing with the property owner or occupier. If this is not possible, temporary connections are to be made at convenient locations as approved by the Employer's Agent.

b) All connections, including backdrops, shall be made to the lined pipe at locations identified by CCTV survey prior to the lining operation and as verified by the Contractor.

c) After liner has cured, the Contractor shall re-instate active and inactive (as directed by the Employer or his duly authorized representative) property and branch connections and backdrops. This shall be performed from inside the lined-pipe without any excavation, whist utilizing a CCTV camera with a robotic

cutter head. Openings cut through liner shall be neat, smooth, and cut to the full opening of the existing connection in order to prevent blockage at such connection. Excess material shall be recovered at downstream manhole, removed and disposed of. **ALL** openings cut into liner shall be grouted along the edges to prevent any water infiltration.

d) **ALTERNATIVELY**, where the above (item (c)) is not possible, connection and backdrop re-instatement shall be in terms of PS4.2.31 (*Localized pipe replacement and repair*), and all replaced fitting shall be SABS approved and installed in accordance with the manufacturer's instructions, for:
   i) PVC pipes and fittings, using either solvent-cement joints or push-on joints or threaded joints or clamps or flanged joints.
   ii) HDPE pipe and fittings, using fusion jointing techniques, clamps or flange joints (either installing flange ended fittings, HDPE flange adapters and mechanical couplings)

   All polyethylene electro-fusion fittings shall be made in accordance with an appropriate and approved specification. If applicable, the grade of polyethylene of the fitting shall be the same as the replacement pipe

e) In the event that a property and branch connection has been cut incorrectly, with regards to position or shape, the Contractor shall be required to implement the necessary repairs, as indicated by the Employer's Agent, at his expense. Depending on the severity of the damage the Contractor shall:
   i) remove the installed liner for the entire pipe length and replace with a new liner; or
   ii) install a small section of lining, as a localised repair, over the entire affected section. He shall ensure that there is no obvious reduction in the pipe diameter at this point which may result in blockages occurring. Additionally he shall ensure that the edges of the repair are extended over the non-affected edges of the liner immediately after the affected area and is sufficiently secured not to become detached for the full life-cycle of the original installed liner.

NOTA BENE: Post repair CCTV camera footage shall be required for the repaired section, fully capturing the full extend of the repair.

PS4.2.26.3 Testing

All sampling and testing of material in accordance with manufacturers specifications.

PS4.2.26.4 Jointing of pipes and fittings

Jointing of the replacement pipe, existing and new fittings shall be:
a) in accordance to manufacturer's recommendations to provide a leak proof joint;
b) sufficiently strong to undergo the loading of the installation process; and
c) subject to acceptance by the Employer's Agent prior to insertion.

PS4.2.26.5 Property or branch connection excavation

a) Property or branch connections shall be exposed and disconnected from the existing pipe prior to commencement of bursting. Property or branch connections to be redirected to manholes or if abandoned need not be excavated.
b) All excavations for property or branch reconnections shall be the minimum necessary to execute the operations. Care shall be taken to prevent material entering the live existing system when performing the disconnection and/or connection.

PS4.2.26.6 Reconnection of property and branch connections

Property connections shall not to be out of service for more than 8 hours, unless otherwise agreed in writing with the property owner or occupier. If this is not possible, temporary connections are to be made at convenient locations as approved by the Employer's Agent. All inline or branch connections shall be addressed by temporary manhole isolation in terms of sub-clause PS4.2.19 (*Pipe length isolation*)

All connections shall be made to the replacement pipe at locations identified by CCTV survey prior to the bursting operation and as verified by the Contractor.

All connections shall be in terms of PS4.2.31 (*Localized pipe replacement and repair*), by means of approved fittings, in accordance with the manufacturer's instructions, for:

a) PVC pipes and fittings, using either, solvent-cement joints, push-on joints, threaded joints, clamps or flanged joints.
b) HDPE pipe and fittings, using fusion jointing techniques, clamps or flange joints (either installing flange ended fittings, HDPE flange adapters and mechanical couplings)

All polyethylene electro-fusion fittings shall be made in accordance with an appropriate and approved specification. If applicable, the grade of polyethylene of the fitting shall be the same as the replacement pipe

NOTA BENE: The replacement pipe shall be left for the manufacturer's recommended time, but normally not less than 4 hours, prior to service reconnections. This period shall allow for pipe shrinkage due to cooling and pipe relaxation due to the tensile stresses induced in the pipe during installation.

PS4.2.26.7 Structures and fittings

Where:

a) the replacement pipe enters or exits an existing structure, the wall shall be restored as specified in the Contract Documents. Restoration shall securely locate and anchor the new product in the wall and shall produce a leak proof seal. The existing structure's benching shall be restored according to the requirements of the new product, any other incoming product, and as specified in the applicable sub-clauses of PS4.2.27 (*Manhole repair and/or rehabilitation*).

b) new structures or fittings are required, they shall be installed as specified in the Employer's standards.

NOTA BENE: The replacement pipe shall be left for the manufacturer's recommended time, but normally not less than 4 hours, prior to structural and fitting installations or repairs. This period shall allow for pipe shrinkage due to cooling and pipe relaxation due to the tensile stresses induced in the pipe during installation.

PS4.2.26.8 Annular gap sealing for burst pipes

All annular gaps between the replacement pipe and the bore or existing pipe, in excess of 10mm, shall be grouted. This compound shall be as approved by the Employer's Agent, but not have such rapid setting characteristics.

NOTA BENE: The replacement pipe shall be left for the manufacturer's recommended time, but normally not less than 4 hours, prior to annular gap sealing. This period shall allow for pipe shrinkage due to cooling and pipe relaxation due to the tensile stresses induced in the pipe during installation.

PS4.2.27 Localized pipe replacement or repair

PS4.2.27.1 Coupling clay or concrete and PVC or PE pipes

The Contractor shall ensure couplings between clay or concrete and PVC or PE pipes are durable and watertight SABS approved. All metal components of couplings shall be denso (or similar approved) wrapped to prevent corrosion.

PS4.2.28 Concrete, formwork and reinforcement

NOTA BENE: *All in situ concrete work (mass and reinforced) shall comply with SANS 1200G ("8. Measurement and Payment" is not applicable) supplemented by the clauses in this section. Where:*

- *SANS 1200G and the clauses in this section are in conflict, the clauses in this section shall take precedence.*
- *the term "plain concrete" appears in SANS 1200G it shall be read as "mass concrete".*

PS4.2.28.1 Cement

Cement shall be Portland cement (or similar approved) complying with the requirements of SANS 50197-1/EN 197-1 or SANS 5831.

Samples of cement from anyone, or from every consignment, may be required by the Employer's Agent or his duly authorized representative for test purposes. Cement in any consignment from which a sample may have been taken for testing shall not be used until it has been approved. Allowance shall be made for possible delay in that tests may take 10 days to carry out.

Bags of cement shall be stacked in a waterproof, solidly constructed shed with a central door and a floor rendered damp-proof with a tarpaulin. The bags of cement shall be closely stacked (but not against walls) in order to reduce air circulation in such a manner that the cement is used in the order in which it was received, *i.e. first in first out*.

Unless otherwise specified in these documents the use of ordinary Portland cement blended with ground granulated blast furnace slag complying with SANS 1491, or ordinary Portland Cement blended with Pulverised Fly Ash complying with SANS 50197-1/EN 197-1 will be allowed in certain instances as an alternative, after acceptance of tender offer, but only with the approval of and at the sole discretion of Employer's Agent. If not so specified in the documents the Contractor must demonstrate a saving in favour of the Employer together with this alternative.

PS4.2.28.2 Sand (Fine aggregate)

The fine aggregate shall comply with the requirements of SANS 1083. Other aggregates may be approved if they have a satisfactory history and/or test results.
No aggregate may be used until it has been approved. Samples having a mass of 25kg (16,5l) of the aggregate proposed to be used may be required by the Employer's Agent or his duly authorized representative for test purposes. Samples having a mass of 25kg shall be forwarded every 3 months during concreting work and also if the source of supply is changed. Allowance must be made for possible delay in that the tests may take 14 days to carry out.

PS4.2.28.3 Stone (Coarse aggregate)

a) The coarse aggregate shall comply with the requirements of SANS 1083. No aggregate may be used until it has been approved. Samples having a mass of 25kg (16,5l) of the aggregate it is proposed to use may be required by the Employer's Agent or his duly authorized representative for test purposes. Samples shall be forwarded every 3 months during concreting work and if the source of supply is changed. Allowance must be made for possible delay in that the tests may take 14 days to carry out.

NOTA BENE: Certain fine-grained sand and stone originating from the Beaufort Series and Karoo Systems which are known by reputation, local experience or tests, to exhibit excessive shrinkage when used in concrete, may be deemed unacceptable by the Employer's Agent or his duly authorized representative.

b) A certificate of proof is required from the Contractor that the aggregates are not alkali-reactive. The cost of testing and certification are to be borne by the Contractor.

PS4.2.28.4 Concrete

Concrete shall be of the classes given in the following table. The proportions of the ingredients and the nominal size of the coarse aggregate for each class shall be as laid down therein:

Class	Cement	Aggregate			Strength (MPa)
	Part	Fine	Coarse	Size	
		Part	Part		
A	1	4	8	50	10
B	1	3	6	38	15
C	1	3	6	19	15

D	1	2	4	38	25
E	1	2	4	19	25
F	1	1 1/2	3	19	30
G	1	1	2	19	40

The strength given in the above table shall be the minimum required at 28 days. Unless otherwise specified Class B concrete shall be used for mass concrete and Class E concrete for reinforced concrete.

Maximum concrete slumps acceptable for different types of construction concrete are as follows:

a) Vibrated reinforced concrete = 50mm
b) Un-vibrated reinforced concrete = 75mm
c) Mass concrete = 75mm
d)

When so required by the Employer's Agent or his duly authorized representative, and whilst concreting is in progress, the consistency of the mixture shall be ascertained by means of the slump test as later described herein.

PS4.2.28.5 Volume batching

The coarse and fine aggregate shall be measured by volume and, unless otherwise directed, cement shall be measured by mass: the volume of a 50 kg bag of cement shall be taken as 33l. Suitable measuring boxes for the coarse and fine aggregates shall be provided to the approval of the Employer's Agent or his duly authorized representative.

The proportions given above are approximate only, and should the Employer's Agent or his duly authorized representative consider that the voids in the coarse aggregate require more or less matrix than is formed by the proportions specified, he may vary the quantities of coarse and fine aggregates to obtain the required density and workability of the concrete, provided that the proportion of cement to the total volume of the aggregate shall not be less than that specified.

When the sand is not completely dry, allowance must be made for bulking due to the moisture content. The amount of bulking shall be determined by the Contractor in the presence of the Employer's Agent or his duly authorized representative.

The amount of water shall never exceed 34l to every bag of cement used, including the water contained in the sand.

Effective screens shall be provided to protect the mixing of concrete during windy weather.

PS4.2.28.6 Weigh batching

The proportioning of the coarse and fine aggregates by mass shall be permitted, providing the method used is approved by the Employer's Agent or his duly authorized representative.

a) All requests received by the Employer's Agent or his duly authorized representative to make use of weigh batching shall be submitted to the Structural Employer's Agent for approval.

b) If the weigh batching process is preferred to volume batching, the proposed mix proportions are to be equivalent to the relevant volumetric mixes as documented previously herein and be based on a minimum cement content.

c) The following procedures must be complied with:

i) The Contractor must timeously obtain written approval for the use of weigh batching and submit all information as set out below, with his application.

ii) The mix transformation from volume to weigh batching shall be carried out at an approved laboratory.

iii) Weigh batching equipment must be calibrated, and a certificate of accuracy must be submitted before such equipment may be used. On contracts of long duration and/or requiring large quantities of concrete, new calibration certificates may be required every four months.

iv) The cement to aggregate ratio by volume for the following mixes will apply:

- Class C (15 MPa) - c/a = 1:9
- Class E (25 MPa) - c/a = 1:6
- Class F (30 MPa) - c/a = 1:4.5
- Class G (40 MPa) - c/a = 1:3

v) The following cement/water ratios by mass must also be complied with:

- Class C (15 MPa) - c/w = 1.30 to 1.35
- Class E (25 MPa) - c/w = 1.65 to 1.80
- Class F (30 MPa) - c/w = 1.90 to 2.05
- Class G (40 MPa) - c/w = 2.30 to 2.50

PS4.2.28.7 Ready mixed concrete

Any application to use ready mixed concrete shall be submitted by the Contractor at an early stage for approval by the Structural Employer's Agent. Only suppliers on the Employer's approved list will be considered.
New applications must be submitted to the Employer, well in advance.

PS4.2.28.8 Strength concrete

The Contractor shall be responsible for the design of strength concrete and for the measurement of the constituent materials to produce concrete that complies with the specified requirements.

a) Trial mixes
The Contractor shall ensure that samples of the constituent materials of the concrete, together with evidence that they comply with the provisions, are supplied for approval in good time and provide the Employer's Agent or his duly authorized representative with:

i) a statement from an approved independent laboratory of the results of tests; or

ii) an authoritative and acceptable report, or record of the previous use of and experience with, the material concerned.
The cement, types of aggregate and their origins shall not be changed throughout the duration of the Contract without giving prior notification to the Employer's Agent who shall verify that the above requirements are complied with and that the important qualities of the concrete shall not be impaired.

b) Consistency
Unless otherwise indicated by the general workability of the concrete, method of transportation, conditions of placement or otherwise specified by the Employer's Agent, the suggested slump values, for different mixes of concrete shall be as specified in this document.

c) Workability
Ensure that the concrete is of such workability that it can be readily compacted into the corners of the formwork and around reinforcement without segregation of the materials and without excessive "bleeding" of free water at the surface.

PS4.2.28.9 Expansion alkali-aggregate reaction

The use of some local aggregates may lead to an expansive alkali-aggregate reaction if the concrete in the structure will be exposed to continual dampness or will be subject to alternate wetting and drying.
Alkali reactive aggregates, i.e. certain granites, quartzites and Malmesbury hornfels (shale), shall not be used in conjunction with high alkali cement for concrete in any part of the works. Where a high alkali cement shall be one in which the equivalent alkali content exceeds 0,60% by mass of the cement.
If the Contractor chooses to use one of the aggregates stated above in lieu of stone as described in this document, he shall:

a) ensure that no high alkali cement is delivered to the site. Any such high alkali cement shall be rejected and the cost of its removal and replacement with cement having an acceptable alkali content shall be borne by him.
b) provide certificates stating the alkali content of each delivery of cement to the site, based on tests carried out at a laboratory approved by the Employer's Agent. The cost of testing, including sampling, transporting of samples and issuing of certificates, shall be borne by him.
c) be entitled to use an approved brand of cement as a means of ensuring that the permissible alkali content is not exceeded. Where he shall make allowance for the higher price of such approved brand, if he chooses to use this method.

PS4.2.28.10 Pumping of concrete

The placing of concrete by pumping in any section of the works shall be subject to the written approval of the Employer's Agent or his duly authorized representative. The Contractor shall furnish full details regarding the mix proportions of the concrete that he intends to place by pumping.

PS4.2.28.11 Admixtures to concrete

The use of admixtures in concrete shall only be considered should special circumstances warrant this and only with the prior written approval of the Employer's Agent. The Contractor shall provide the following information:

a) the trade name of the mixture, its source and the manufacturer's recommended method of use;
b) typical dosage rates and possible detrimental effects of both under and over dosage; and
c) the expected average air content of freshly mixed concrete containing an admixture which causes air to be entrained when used at the manufacturer's recommended rate of dosage.

PS4.2.28.12 Slump test

The apparatus and the method of determination of the slump of freshly mixed concrete shall comply with SANS 5862-1.

a) Apparatus
   i) A mould in the form of a frustum of a cone and having the following nominal internal dimensions:
      - Bottom diameter : 200mm
      - Top diameter : 100mm
      - Height : 300mm

   The mould shall:
   - be of a metal (other than brass or aluminum) of side thickness at least 1.6 mm and shall have a smooth internal surface.
   - have suitable base plate and handles to facilitate lifting it from the test specimen in a vertical direction.
     i. The tamping bar shall have a nominal diameter of 16mm, a length of 600mm and with sharp corner rounded off at one end.

b) Procedure:
   The test shall be carried out in an area that is free from vibration and shocks. Ensure that the internal surfaces of the mould are free from set concrete and are clean and dry.
   Place the mould with the bottom on a smooth, horizontal, rigid, non-absorbent surface and hold the mould firmly in place while it is being filled as follows:
   i) in four layers, each thickness approximately one-quarter of the height of the mould. Tamp each layer with 25 strokes uniformly spaced over the cross-section of the mould. Tamp the bottom layer throughout its depth and ensure that when tamping the second and subsequent layers the strokes penetrate into the underlying layer.
   ii) after the top layer has been tamped, strike off the concrete level so that the mould is exactly filled. Clean off any concrete that may have leaked out between the mould and the supporting base-plate surface. Remove the mould from the concrete immediately by slowly and carefully raising it in a vertical direction. This will allow the concrete to subside.

Immediately measure the slump, to the nearest 5mm, by determining the difference between the height of the mould and the height of the specimen.
Regard the test as invalid, if a slump specimen collapses or shears off laterally, discard the result and repeat the test.

PS4.2.28.13 Concrete cubes

The apparatus for making and testing of concrete cubes shall comply with SANS 5863.

a) Apparatus
Cubic metal moulds shall:

- be steel;
- be machined and adequately strengthened to resist distortion;
- have an internal distance between faces of 150mm;
- be constructed so as to facilitate the easy removal without damage of the moulded specimen; and
- have a metal base plate which shall be attached to the mould by springs or screws.

When assembling the mould for use, the joints between the sections of the mould, the contact surfaces between the bottom of the mould and the base plate, and the internal faces of the assembled mould shall be thinly coated with a grease or oil that will prevent leakage of water through the joints and adhesion of the concrete to the mould.

The tamper must be a steel bar of length 400mm and mass 1.8kg and having a 25mm square ramming face.

b) Sampling and making cubes
Sampling shall comply with SANS 5861-2.

One set of 3 cubes shall be required for every 40m^3, or part thereof, of concrete cast. The sample taken from a batch of concrete and sufficient to make 3cubes shall be placed in a tray or on a platform and mixed thoroughly.

The moulds shall each be filled in 3 layers of approximately 50mm thick concrete. Each layer shall be compacted with the tamping rod, with at least 35 blows to give full compaction of the concrete.

After the top layer has been compacted, strike off the surface of the concrete with a trowel, level with the top of the mould.

Any small hollows shall be filled in with additional concrete. Cement/sand slurry shall not be worked into the surface.

At this stage, the identity of each sample shall be placed on the moulded cube, by means of a label of absorbent material and not by scouring of the surface of the concrete.

c) Curing cubes on site

Cover the test cubes in their moulds with an impervious sheet or wet sacking and store indoors in a place that is free from vibration, excessive draughts, cold and direct sunlight.

After 24 hours the cubes shall be demoulded, remarked with a waterproof crayon or marker and placed in a curing tank for 7 days before being transported to the laboratory.

The Contractor shall supply the curing tank which shall incorporate a thermostat to control the water temperature at 22 to 25°C and shall be kept within a building.

d) Testing of cubes
The testing of all concrete cubes shall be done in accordance with SANS 5863 by a laboratory approved by the Employer's Agent.

A suitable testing machine of sufficient capacity having an accuracy and repeatability that comply with the requirements for Grade A machines of BS 1610 "Method for the load verification of testing machines" shall be used to test the compressive strength of each cube.

The Contractor is responsible for the provision of the cube moulds and for timeous delivery of the cubes to the laboratory.

PS4.2.28.14 Concrete quality

Should the Contractor dispute any results obtained from concrete test cubes, the concrete represented by the cubes shall be considered acceptable if the Contractor, at his own cost, proves to the satisfaction of the Employer's Agent that the estimated actual strength of cores taken from the structure (by an approved independent testing laboratory and determined in accordance with SANS 5865 is not less than the specified strength. If the concrete fails to meet the strength criteria stipulated, the Employer's Agent may at his sole discretion and in addition to the options listed in SANS 1200G:

a) accept the concrete subject to approved remedial measures being undertaken by the Contractor at his own cost; or
b) permit the concrete to remain, subject to reduced payment for lower strength concrete.

PS4.2.28.15 Concreting

It is essential that the Contractor representative who has charge of the construction of all concrete work, whether reinforced or not, shall be skilled in this class of work, and shall personally supervise the whole construction, paying special regard to:

a) the quality, testing and mixing of the materials;
b) the laying of the material in place and the thorough compaction of the concrete to ensure solidity and freedom from voids;
c) the construction and removal of formwork; and
d) the sizes and positions of the reinforcement.

Particular care shall be taken to work concrete against formwork and around reinforcement. Internal vibrators may be used with the approval of the Employer's Agent

or his duly authorized representative but external vibrators which act only on the formwork WILL NOT be permitted.

Concrete to be reinforced shall be deposited in such quantities as will permit of it being properly compacted around the reinforcement.

The placing of concrete shall be completed within ½ hour after mixing or within ½ hour after agitating and within 2,5 hours after mixing in the case of ready mixed concrete. Under no circumstances shall concrete be incorporated into the work after it has attained its initial set.

Care shall be taken to prevent, as far as possible, the formation of laitance or scum. Laitance is to be understood to mean the scum of strengthless and inert material which forms on the surface of concrete.

Concrete shall not be dropped into position from a height greater than 2.5m unless prior approval is obtained from the Employer's Agent.

If an inclined chute is used for transporting concrete, it shall be of such slope as will ensure a continuous flow of concrete without the use of an excessive quantity of water and without segregation of the aggregates. The chute must be flushed out and properly cleaned before and after each working period. All waste from flushing shall be discharged outside the formwork.

In beams, each portion of a successive layer shall be placed as soon as the concrete below has been properly worked around reinforcement and against formwork. Concreting shall be carried forward in irregular steps, that is to say, one layer shall not be completed over the whole section before the succeeding layer is commenced. Concreting of slabs and beams shall, as far as possible, be carried forward in one operation. When concreting has to be interrupted the concrete shall be left with a level, rough top surface with ends vertical. The concrete shall not be merely sloped down.
On resuming concreting, the old surface shall be roughened and all laitance thoroughly and carefully removed before any new concrete is deposited. This must be carried out by brushing the surface of the concrete while it is still green. Great care must be taken to avoid any weakness at the junction of old and new concrete and the old surface shall be coated with a thin layer of cement and sand mortar, in the same proportions as that of the adjoining concrete.

While the concrete is setting it shall not be disturbed or shaken by traffic, either on the concrete itself or upon adjoining formwork.

No holes in concrete elements shall be patched or filled in without inspection, instruction and approval of the Employer's Agent or his duly authorized representative.

No concreting shall be carried out when the air temperature is below 4°C when it is rising and 8°C when it is falling.

Before concreting is commenced the Contractor shall give the Employer's Agent or his duly authorized representative 24 hours' notice of his intention to do so. On sites further than 200km from the Employer's Agent or his duly authorized representative, 48 hours' notice must be given.

Concrete surface beds, excluding heavy industrial floors etc. shall be Class C concrete and shall be laid in suitable size panels not exceeding 20m^2 in area and with the length of any panel not exceeding 4.5m.

Where concrete beams are supported on concrete columns, the columns are to be concreted up to the underside of such concrete beams and then concreted up to the top of the beams, integral with the beams.

NOTA BENE: Any finish applied to the surface of concrete floors, is to be understood as being additional to the thickness of the concrete described or shown on the drawings.

PS4.2.28.16 Curing of concrete

After the concrete has been placed, all exposed surfaces shall be kept continuously damp for at least
10 days by methods as may be approved by the Employer's Agent or his duly authorized representative, such as covering with approved building paper, or by means of wet canvas, wet sacks, wet sand, by continuous hosing or ponding with water.

PS4.2.28.17 Concrete lintels (cast in-situ)

Concrete lintels cast *in-situ* shall be of Class E concrete, reinforced with steel reinforcement as well as of depths specified in the table hereunder. Each lintel shall be the full thickness of walls into which they are cast and 450mm longer than width of openings.

Clear or daylight span	Depth in brick courses	Reinforcement
< 1m	3	Nil
≥ 1m ≤ 1.5m	3	One 12mm diameter mild steel rod, 40mm up from bottom, for each half brick width of soffit.
> 1.5m ≤ 2m	4	One 16mm diameter mild steel rod, 40mm up from bottom, for each half brick width of soffit.
> 2m	To detail	To detail.

PS4.2.28.18 Building on concrete footings and beams

No brickwork, stone walling or other structure shall be built on concrete footings until at least 3 days after placement of the concrete in the case of mass concrete footings and after 7 days in the case of reinforced concrete footings or as may otherwise be directed by the Employer's Agent or his duly authorized representative.

No brickwork, stone walling or other structure shall be built on reinforced concrete beams or similar members until the formwork and all propping or supports have been removed.

PS4.2.28.19 Slip joints between concrete and brickwork

Slip joints shall be provided between brickwork and concrete slabs and beams by levelling up and trowelling smooth the bearing surfaces of brickwork with 3:1 cement mortar and covering the bearings before the concrete is cast, with two layers of one side smooth tempered hardboard, with the smooth sides in contact.

The ends and sides of beams and edges of concrete slabs shall be separated from the brickwork with 13 mm thick bitumen impregnated softboard or expanded polyethylene strips placed vertically against the brickwork before the concrete is cast.

Similar slip joints shall be provided between brickwork and concrete lintels cast *in situ,* but without softboard or expanded polyethylene strips at ends.

PS4.2.28.20 Movement joints

All movement joints are to be filled in with approved bitumen impregnated softboard or expanded polyethylene strip unless otherwise specified or detailed on drawings. Form similar movement joints where pathways adjoin structures externally.

PS4.2.28.21 Cutting, punching or hacking concrete

No reinforced concrete shall be cut or hacked without the approval of the Employer's Agent or his duly authorized representative.

PS4.2.28.22 Forming key to concrete for plaster and other finishes

Where rough formwork has been used, surfaces of concrete to receive plaster and other finishes, shall, immediately after the formwork has been removed, be well wetted and wire brushed whilst the concrete is still green and then slushed over with 2:1 cement grout to form a key for the finish, all to the approval of the Employer's Agent or his duly authorized representative. The slushing is to be allowed to set hard before the finish is applied.

Where smooth formwork is used, surfaces of the concrete to receive plaster and other finishes shall be hacked, on the distinct understanding that hacking of concrete shall be at no extra cost.

Surfaces of concrete receiving plaster or other finishes shall not be plastered or finished until the Employer's Agent, or his duly authorized representative has signified his opinion that the surfaces are suitable to receive plaster or other finishes.

PS4.2.28.23 Sleeves pieces

Where it is necessary to leave plugs or holes in beams, slabs or any other reinforced concrete, all such plugs or holes must be situated in positions approved by the Employer's Agent or his duly authorized representative before concreting. Where it is necessary to carry pipes, bolts, wires or any other fittings through reinforced concrete members, approved pipe sleeves must be provided and placed in position before concreting.

All necessary bolts, plugs, brackets, cramps, etc. shall be cast into the concrete as the work proceeds.

PS4.2.28.24 Ties

Where brickwork abuts against concrete, the brickwork is to be tied to the concrete with galvanized hoop-iron ties 1.6mm thick by 3mm wide and approximately 600mm long to every third course of brickwork with one end of each tie cast approximately 150mm deep into the concrete. Where such fixing is impossible, i.e. where steel formwork is used, the ties are to be gun-nailed against concrete with steel nails not less than 38mm long.

PS4.2.28.25 Bagged finish to concrete

Concrete surfaces to receive bagged finish shall be prepared by removing sharp projections and making good defects with 3:1 cement mortar. Finish by rubbing over the whole area with wet rough sacking and cement grout to obtain an even surface.

PS4.2.28.26 Power floated finish

Power floated finish to floors or slabs means that surfaces shall be floated mechanically to a smooth and even finish before the concrete has set. Small areas inaccessible to the machine are to be floated by hand. Under no circumstances is cement mortar to be added while floating the concrete.

PS4.2.28.27 "No-fines" concrete

"No-fines" concrete, for grading flat concrete roofs and the like to falls, shall be in the proportion of
12 parts 19 iron cubical stone to 1 part cement mixed with 20l water per bag of cement and be
laid to falls of not less than 15mm per linear metre for mastic asphalt and not less than 20mm per linear metre for sheet roof covering. For heavy load applications special mix designs may be required.

a) Fillets against upstands
Form triangular fillets, size 75 x 75mm, in corners with walls, kerbs, etc. neatly mitred at angles, stopped where necessary and finished smooth ready to receive waterproofing.

b) To raised floors, bases and other
"No-fines" concrete for raised floors, bases, etc. shall be in the proportions specified. Finish smooth with 3:1 sand/cement screed to receive waterproofing.

PS4.2.28.28 Cellular concrete

Cellular concrete, for grading flat concrete roofs and the like to falls, shall be laid in situ in required layers; the bottom layer having a density of 400kg/m^3, dressed to falls by varying the thickness, and a 20mm thick top layer having a density of 960kg/m^3.

PS4.2.28.29 Formwork

Formwork shall include all shuttering, casing and centering of material required for the laying and forming of concrete floors, slabs, beams, lintels, walls, steps, columns, piers, pilasters and any other concrete work requiring moulds or forms and shall embrace all cleats, battens, fillets, wedges, struts, trestles, braces, props, shores and other requirements of material for keeping all in correct position. All materials used for formwork must be suitable and substantial and all joints must be tight enough to prevent leakage of liquid matrix.

All formworks must be designed by the Contractor and if requested to do so, he must submit fully detailed and dimensioned working drawings to the Employer's Agent or his duly authorized representative for checking purposes. Acceptance of the proposals shall not relieve the Contractor of his responsibility for the safety and stability thereof nor for any loss or damage arising out of defective design, materials and/or workmanship.

The formwork must be so constructed that its partial removal can be carried out to the satisfaction of the Employer's Agent or his duly authorized representative and in such stages as are required by the working conditions. As far as possible, wedges and clamps must be used in preference to nails. All formwork in its various sections for floors, beams, etc. must be so arranged that the whole may be raised or lowered either independently or together with other sections by means of wedges or other approved methods.

Immediately before concreting is begun, the formwork in contact with the concrete must be thoroughly cleaned, wetted and kept damp whilst the concrete is being placed.

Great care must be taken to keep the formwork wedged up to its correct height and this must be checked by taking levels immediately before concreting is commenced and immediately after it has been completed.

All beams shall have a camber of 6mm to every 3m of length.
The minimum periods that the formwork to the various parts of the structure is to remain in position after concreting shall be as stated in the following table:

Description	Normal cement		Rapid hardening cement	
	Weather		Weather	
	Normal	Cold	Normal	Cold
Beam sides, walls, unloaded columns	2 days	4 days	1 days	2 days
Slabs with props left under	4 days	7 days	2 days	4 days
Beam soffits with props left under including ribbed slabs	7 days	12 days	3 days	5 days
Removal of slab props	10 days	17 days	5 days	9 days
Removal of beam props	14 days	28 days	7 days	12 days

When determining the stripping time for formwork the weather shall be considered to be "normal" when the temperature is above 18°C and "cold" when the temperature is between 5°C and 10 °C, these being the average daily temperatures of the atmosphere adjacent to the concrete. When the average daily temperature lies between the above values for "normal" and "cold" weather the minimum period for stripping of formwork shall be determined by the Employer's Agent or his duly authorized representative.

Notwithstanding the above minimum periods, formwork may be struck immediately, once the concrete in the various parts of the concrete work has attained the crushing strengths required by the Employer's Agent or his duly authorized representative. The crushing strengths must be determined by proper tests, which shall be carried out by the Contractor.

No formwork of any nature shall be struck, either after the elapse of the minimum periods stated in the above table or on the attainment of the required crushing strengths of the concrete, without the prior consent of the Employer's Agent or his duly authorized representative. Such consent shall not absolve the Contractor of his responsibility for the safety of the works.

In structures having either in whole or in part, two or more reinforced concrete floors, props shall be provided under the soffits of any beam or slab of any floor which is being used to support the formwork and wet concrete of the floor above, all to the approval of the Employer's Agent or his duly authorized representative. The props shall not be removed until the formwork supporting the concrete of the floor above has been struck.

Under no circumstances shall steel formwork be oiled where concrete is to receive plaster.

PS4.2.28.30 Smooth formwork

Smooth formwork shall be any material approved by the Employer's Agent or his duly authorized representative which is to be used to leave concrete surfaces smooth when removed and where no other finish is to be applied.

PS4.2.28.31 Reinforcement rods

a) Mild steel
Mild steel shall comply with the requirements of SANS 920, Type A or B.

b) High tensile steel
High tensile steel shall comply with the requirements of SANS 920, Type C or D.

PS4.2.28.32 Concrete reinforcement

a) Rod reinforcement
Bending and hooking of rods shall be done in accordance with SANS 282. Rods shall be bent cold in an effective bending machine, or properly designed rod-bender using a steady pressure and not by hammering.

Diameters, lengths and positions of rods as shown on the drawings must be strictly adhered to. Joints in rods in beams, stairs, etc. will be permitted only where shown on drawings.

Before being placed in position, the rods shall be thoroughly cleaned of all grease, dirt, bituminous material, scale and loose rust.

All distribution rods shall be straight and shall extend at least 150mm into beams or other support. Unless otherwise shown on the drawings, all joints in reinforcing rods shall be lapped 40 times the diameter of the rod. The laps shall be securely tied with 1.25mm diameter annealed mild steel binding wire.

Reinforcement for piles, column footings, columns and walls shall be tied at every intersection, or as directed or shown on drawings, with similar binding wire. Reinforcement in beams shall be tied at alternate intersections in a diamond pattern, unless circumstances demand every intersection.

Great care must be taken to retain the reinforcement in its correct position during the entire period of concreting. Blocks of fine concrete, size approximately 40 x 40mm, or plastic spacers, shall be provided on the formwork to soffits of beams to ensure than the rods are retained in position and that the correct concrete covering to the main reinforcing rods is provided. The blocks shall be of thickness required and shall be placed under the main reinforcing rods at approximately 600mm centres.
Reinforcement in the top of slabs and the like shall be retained in position by means of cradles (stools), formed of steel reinforcing rod as follows:

- R10 for height range 100-300mm and maximum width of 300mm.
- R12 for height range 310-500mm and maximum width of 45 mm.

Recommended spacing of supports for horizontal bars in slabs:

- not further than 600mm apart (cradles ±1000 mm c/c in both directions) for bar diameters up to 12mm.
- not further than 1,000mm apart (cradles ±1 500 mm c/c in both directions) for bar diameters of 16mm and over.

Stools are to be placed on the bottom layer of reinforcement, securely retained in position and with correct concrete cover as specified. Cradles are to be securely wired to the slab reinforcement with binding wire. Beam rods in different layers shall be separated by means of steel spacer bars of suitable diameters and lengths.

Double mats in concrete walls shall be kept in their respective positions by means of suitable steel clips.

Recommended spacing of supports for vertical bars in walls:

- 1,000mm centres in both directions for bars up to 12mm diameter; and
- 1,500mm centres in both directions for bars of 16mm diameter and over.

Supports can be spaced more closely by the design Employer's Agent, depending upon the circumstances.
All stirrups shall be properly fastened to the rods so as to retain their relative positions during the entire period of concreting.

Welding of main rods will not be permitted unless approval has been given by the
Employer's Agent or his duly authorized representative. Spot welding in lieu of wiring may be used to secure rods and stirrups in position.

The concrete covering the main reinforcement, unless otherwise specified, shall not be less than that stated in the following table:

Position	**Amount of cover**
Soffit of slabs	**The diameter of the main rods, but never less than 15mm (mm)**
End of beams	40
Soffits of beams	40
Sides of beams	40
Sides of columns	40
Slab underground	40
Concrete walls	25
Walls exposed to ground	40
Ground beams	40
Foundations	75
Water retaining structures and within 1 km from coast	50

In cases not included in the above table the cover shall be not less than 25mm. Depending on the condition of exposure and fire resistance requirements, concrete cover can be varied by the Employer's Agent but in no case shall the concrete cover be less than the diameter of the rod to be covered.

The cover shall be measured from the face of the concrete to the outside of main reinforcement nearest the face of the concrete and shall exclude plaster and similar finishing materials.

Three samples of each diameter of reinforcing rods, each approximately 600mm long, must be taken from each consignment of rods of similar diameter, for testing. If any sample is found unsatisfactory, the whole consignment of rods from which the samples were taken shall be rejected.

Top reinforcement in cantilever slabs to be kept in position with a first row of stools or chairs
300mm from the beam or support, and thereafter at a maximum of 40 bar diameters under each bar.

The cover blocks, spacers, bars and stools or chairs are to be placed and/or wired in position by the steel fixer.

b) Welded steel fabric reinforcement
All welded steel fabric reinforcement shall comply with the requirements of SANS 1024. The preferred dimensions are as follows:

1	**2**	**3**	**4**	**5**	**6**
Fabric Reference	**Nominal pitch of wires**	**Nominal diameter of wires**		**Nominal mass***	

number	Longitudinal (mm)	Cross (mm)	Longitudinal (mm)	Cross (mm)	kg/m2
617	200	200	10.0	10.0	6.17
500	200	200	9.0	9.0	5.00
395	200	200	8.0	8.0.	3.95
311	200	200	7.1	7.1	3.11
245	200	200	6.3	6.3	2.45
193	200	200	5.6	5.6	1.93
100	200	200	4.0	4.0	1.00
772	100	200	10.0	7.1	7.72
655	100	200	9.0	7.1	6.55
517	100	200	8.0	6.3	5.17
433	100	200	7.1	6.3	4.33
341	100	200	6.3	5.6	3.41
289	100	200	5.6	5.6	2.89
278	100	300	6.3	4.0	2.78
226	100	300	5.6	4.0	2.26
133	100	300	4.0	4.0	1.33

*These mass values are based on the wires having mass of 0,00785 kg/mm2 per metre of length.

The actual mass of the fabric should not differ from the nominal value by more than 6%.

PS4.2.29 Precast concrete

PS4.2.29.1 Materials

Cement, water, aggregates and reinforcement shall be as described under the concrete section.

PS4.2.29.2 Concrete, formwork and reinforcement

PS4.2.29.3 Concrete

Concrete shall be as described under the applicable concrete section(s). Unless otherwise specified a Class E concrete shall be used but with coarse aggregate of an appropriate size.

PS4.2.29.4 Mould units

The whole of this work is to be carried out by a specialist, who has appropriately skilled workers in this class of work.

All materials and finishes are to be to the approval of the Employer's Agent or his duly authorized representative.

The moulds are to be properly constructed in the best and most up to date practice, made up in suitable sections with all necessary reinforcement, cramps, bands, bolts, etc. for fastening together and are to be constructed so that castings can be easily removed and the moulds re-used without distorting.

Those sections of the moulds which will produce the finished faces of the units are to be specially prepared, perfectly smooth, except where the finish is of exposed aggregate, true to shape and coated with a suitable solution which will prevent units adhering to the moulds, while not in any way discolouring the finished surfaces.

All cast units are to be properly cured, and no units are to be fixed or built in until 28 days after casting.

Units are to be properly protected from the elements while curing and are to be kept wet for at least 10 days after casting by frequent spraying with clean water.

Form all necessary checkings, mortices, lugs, etc. for cramps and dowels when casting.

PS4.2.29.5 Terrazzo blocks

Precast terrazzo work shall be generally as prescribed for precast concrete above. The coarse aggregate of the mix of which blocks are to be formed shall be of 10mm stone. The finish to exposed faces shall be 10mm thick.

PS4.2.29.6 Smooth finish

Where described as "finished smooth from the mould" such surfaces shall have a layer composed of 1 part (volume) cement and 4 parts (volume) clean fine sand, packed against the faces of the mould before placing the concrete backing. The concrete backing shall be deposited into the moulds in a wet state (not dry pressed) whilst the facing is still wet.

Projections shall be rubbed off and faces shall be of even colour and free from blemishes, cracks and other imperfections. Salient angles shall be arris rounded.

PS4.2.29.7 Sizes

Sizes given are approximate; the Contractor shall be responsible for ascertaining the exact sizes based on actual measurements.

PS4.2.29.8 Reinforcement

Unspecified reinforcement required for manufacturing, handling and erection purposes and for reinforcing projecting and other unwieldy portions of blocks shall be provided by the Contractor at his discretion, but such action shall be highlighted to the Employer's Agent.

PS4.2.29.9 Bedding, joint and pointing

Blocks shall be bedded and jointed solidly in cement mortar composed of 3 parts (volume) of sand and 1 part (volume) of cement and shall be pointed with slightly keyed joints.

PS4.2.30 Masonry

(Including brickwork and stone masonry)
NOTA BENE: Where sizes in descriptions are given in brick units, "one brick" shall represent the length and "half brick" the width of a brick.

PS4.2.30.1 Lime

Lime shall be hydrated bedding mortar lime in accordance with the requirements of SANS 523.

PS4.2.30.2 Cement

Cement shall be as specified in the concrete section.

PS4.2.30.3 Sand

Sand shall comply with the requirements of SANS 1090, unless specialist advice is obtained. A sample of 25kg must be delivered to an approved laboratory for testing purposes.

PS4.2.30.4 Burnt clay bricks

a) Burnt clay bricks shall comply with the requirements of SANS 227, and shall be equal in all respects to the selected samples.
b) Clay bricks for foundations shall be as described in (a) above, but extra hard burnt.
c) Where bricks with holes are used, the holes in such bricks must only be filled in solid with mortar where specifically specified.
d) All bricks that do not carry the SABS Mark, must be tested by an approved laboratory.

PS4.2.30.5 Firebricks

Firebricks shall be of well burnt refractory fireclay, resistant to spalling and cracking and of same size as ordinary bricks.

PS4.2.30.6 Local stone

Local stone shall be from an approved quarry, free from defects and to the satisfaction of the Employer's Agent or his duly authorised representative.

PS4.2.30.7 Freestone

All freestone shall be the best and most durable of its kind, free from vents, loose beds, oxide veins and other imperfections to the satisfaction of the Employer's Agent or his duly authorised representative and shall be set on its natural quarry bed.

PS4.2.30.8 Mortar tests

a) Sampling
The frequency of sampling will be decided by the Representative/Agent. Sufficient mortar shall be taken from each of the points of laying to prepare a composite sample to make a set of three mortar cubes.

b) Moulding
Cube moulds with a nominal size of 100mm, that comply with SANS 5863 must be used.
Fill each mould with mortar in three equal layers and compact each layer by means of a tamper. The tamper must be made of hard wood with a flat tamping surface with nominal dimensions of 50 x 25mm and shaped to provide a round stem of approximately 25mm diameter and long enough to afford sufficient hand grip. Immerse the tamper in water for 15 minutes before use.
Each layer of mortar must be compacted by means of 8 evenly spaced pressing strokes of the tamper. After the final layer has been tamped, the excess mortar must be struck off level with the top edges of the moulds.

c) Curing

Cover the test cubes (in their moulds) with an impervious sheet followed by wet matting, sacks or similar material, and store them in a place free from vibration, excessive draughts and direct sunlight.
After 24 hours mark each cube so that it can be identified. After 48 hours the cubes shall be removed from their moulds and placed into water in a curing tank at 22 to 25 °C for a minimum period of 7 days before they are transferred to the approved testing laboratory. Ensure that loss of moisture is prevented during transportation and that they are well protected against damage.

d) Testing of cubes
The testing of all mortar cubes will be done by a laboratory approved by the Employer's Agent and in accordance with SANS 5863.

PS4.2.30.9 Cement mortar

Cement mortar shall be composed of 6 parts (by volume) of sand and 1 part (by volume) of cement. The material shall be mixed dry until of uniform colour and then water added, and the mixture turned over until the ingredients are thoroughly incorporated. Cement mortar shall be produced in such quantities as can be used before commencing to set as no cement mortar that has once commenced to set shall be used in any way.

Care shall be taken in mixing cement mortar to remove from the mixing machine or platform any old mortar that has already set as such mortar may not be incorporated into any new batch.

Mortar should achieve the minimum required strength (in MPa) for the classes of mortar as set out in the National Building Regulations.

PS4.2.30.10 Compo mortar

Compo mortar shall be composed of 6 parts (by volume) of sand — depending on the quality of the sand available, 1 part of lime and 1 part of cement (by volume). The lime and sand shall be mixed dry, then mixed wet, before the cement is added, approximately ½ hour before using and the adding of the necessary additional water as required.

Compo mortar shall be produced in such quantities as can be used before commencing to set, as no compo mortar that has once commenced to set shall be used in any way.

Mortar should achieve the minimum required strength (in MPa) for the classes of mortar as set out in the National Building Regulations.

PS4.2.30.11 Brickwork

Brickwork shall be:

a) wherever practicable, built in English bond. No false headers shall be used and none but whole bricks employed, except where legitimately required to form bond.
b) built level and plumb with mortar as specified.
c) laid on a solid bed of mortar and all joints thoroughly grouted up solid throughout the whole width of each course.
d) carried up in a uniform manner, no one portion being raised more than 1.2m above another at any one time.

Clay bricks shall be well saturated with water, in the stack or dump, approximately 2 hours before
being used. The tops of walls left unfinished shall be well wetted before work recommences.

NOTA BENE: *Cement or concrete bricks shall not be wetted.*

All rough and fair cutting, cutting of splays, skewbacks, chamfers, etc. shall be properly performed.
Form or leave all necessary openings for pipes etc. and make good after pipes etc. are fixed in position.

PS4.2.30.12 Brickwork in cement mortar

a) All brickwork below damp course level, all isolated piers three bricks wide and under, half brick thick walls and chimney stacks above ceiling level, shall be built in cement mortar as specified.
b) Brick arches and brick lintels shall be built in cement mortar as specified, but in the proportion of 3:1.

NOTA BENE: *This clause is essential where compo mortar has been specified.*

PS4.2.30.13 Mortar joints

Mortar joints to brickwork generally shall be 10mm in thickness with level bedding joints. The joints in brickwork:

a) receiving plaster, tiling or similar finishes shall be raked out whilst the mortar is soft to form key for the plaster or mortar backing. The depth of the raking out shall depend on the condition of the bricks; i.e. the rougher the bricks on face the shallower the raking out and the smoother the bricks the deeper the raking out.
b) shall be flushed off where walls are to be bagged, in readiness for the bagging.

PS4.2.30.14 Grout in joints in brick foundation walls

All joints in brick foundation walls shall be grouted in solid with 3:1 liquid cement mortar to obviate any crevices for ant (termite) tracks.

PS4.2.30.15 Brickwork thicknesses

Walls built in two or three half brick thicknesses shall only be built where bonded brickwork (as specified) proves impractical or where required due to the prescribed bond of faced brickwork, all tied together with metal ties in accordance with SANS 28, of the Butterfly Types only, of sufficient length to allow not less than 75mm of each end to be built into brickwork. Ties shall be evenly spaced at not more than 1m apart to every third course and staggered.

PS4.2.30.16 Brickwork in linings

Brick linings to concrete shall be tied thereto with 4mm diameter galvanized crimped wire ties bent at ends and of necessary length to allow 75mm to be cast into concrete and 75mm of the other end to be built into brickwork and evenly spaced at not more than 1m apart to every third course and staggered.

PS4.2.30.17 Half brick thick walls

Half brick thick walls shall be built in cement mortar (as specified) and reinforced with 75mm wide brick reinforcement (as specified), 1 row to every 8 courses in height, and built 100mm into main connecting walls. The reinforcement shall be lapped 150mm at end joints, where these are necessary, and 75mm at angles.

Brickwork shall be built level and plumb.

PS4.2.30.18 Beam filling

Beam filling shall be half brick thick, built up in mortar as used in the walls below, cut in between roof timbers and carried hard up to underside of roof covering and flushed up with mortar.

PS4.2.30.19 Reinforced brick lintels

Reinforced brick lintels shall be built with sound machine made bricks in 3:1 cement mortar with all vertical and horizontal joints filled solid with mortar throughout the required number of courses and to a distance of at least 330mm on either side of the clear opening.

The number of courses in lintels over the various size openings shall be as specified in the table hereunder and reinforcing steel wires or rods shall be built into the first horizontal joint over the bottom course to the number specified in the following table:

Clear or daylight span	Number of courses	Reinforcement
< 1m	4	One row 75mm wide brick reinforcement as described below, for each brick width of soffit.
≥ 1m ≥ 1.5m	6	Ditto
> 1.5m ≤ 2m	7	Three 6.3mm diameter mild steel rods for each half brick width of soffit.
> 2m ≤ 3m	8	Ditto

Brick reinforcement shall be of hard drawn mild steel comprising two 2.8mm diameter main wires spaced 75mm apart and 2.5mm diameter cross wires spaced at not exceeding 300mm apart, welded to main wires.

The reinforcing wires and rods shall be of length at least equal to the width of the clear opening plus 330mm at each end. The reinforcement shall be evenly spaced in the brick joints with the outer wires or rods having at least 20mm cover from face of brickwork.

Brick lintels in 270mm thick cavity walls shall be built with inner face of outer thickness, for a depth of three courses above soffit, covered with sheeting as for damp course, the full length of lintels, and space between the two thicknesses for the depth of the sheeting filled in solid with Class E concrete.
Where cavities continue above lintels, the sheeting shall be taken up and turned on to top of first course of brickwork to inner thickness of wall above the concrete filling in lintels. The sheeting is not required in lintels protected from the weather.

The lintels, except where built over pressed steel door frames and the like, shall be supported on temporary turning pieces of suitable and substantial construction left in position for at least 14 days for long spans (1 to 3m).

PS4.2.30.20 Hollow tile lintels

Hollow tile lintels shall be formed with approved 300 x 220 x 110mm burnt clay hollow tiles each having not more than 3 cavities. The tiles shall be set end to end and the cavities filled up solid with Class E concrete.

Lintels shall have bearings of not less than 220mm on walls at ends.

The lintels over the various size openings shall be reinforced as specified in the following table:

Clear or daylight span	Reinforcement
≤ 1m	One12mm diameter mild steel rod in upper and lower cavities
> 1m ≥ 1.5m	One16mm diameter mild steel rod in upper and lower cavities

The reinforcing rods shall be placed 12mm from top and bottom edges of concrete filling to upper and lower cavities respectively.
Lintels over openings not exceeding 1m wide in 1 brick thick walls shall be on flat and in all other cases shall be on edge using 2 or more lintels in walls 1 brick thick and over, built side by side, to make up the thickness of walls.

Lintels in 270mm thick cavity walls shall be in two 110mm thicknesses with inner face of outer thickness covered with sheeting as for damp-course, the full length and depth of lintel, and the space between the two thicknesses filled in solid with Class E concrete. Where cavities continue above lintels the sheeting in lintels shall be taken up and turned on to top of first course of brickwork to inner thickness of wall.

Lintels shall be made not less than 21 days before building in and shall be cured for at least 14 days by being kept damp in a shaded position.

The lintels shall be hoisted into position and bedded and grouted in solid in cement mortar.

PS4.2.30.21 Pre-stressed lintels

Pre-stressed lintels shall be vibrated concrete reinforced with stressed high tensile steel wires, or of burnt clay blocks with similar reinforcing wires embedded in grooves in the blocks in 1:3, cement:sand mortar, or of other approved form of construction.
Concrete in lintels shall attain a crushing strength of at least 34MPa at 28 days for ordinary and at 7 days for rapid hardening cement.

The reinforcing wires shall be of ductile high tensile steel wire not less than 4mm diameter and of tensile strength of at least 1,350MPa and shall be stressed to not less than 850MPa.

The lintels may be in a single width to the thickness of wall or may be in two widths, placed side by side, and shall have a depth of not less than 60mm. Top surface of lintels shall be suitably roughened, indented or shaped to give a good bond between the lintels and the mortar for the first course of brickwork above,

Lintels shall have bearings of not less than 225mm on walls at each end.
The number of reinforcing wires in lintels for the various wall thicknesses and spans shall be not less than specified in the table hereunder, and brick courses over lintels of the number indicated in the table and for the full length of lintels shall be built in 3:1 cement mortar with all joints filled solid with mortar:

Nominal wall thickness (mm)	Clear or daylight span	Number of wires (in total number of lintels used)	Number of brick courses over lintel
90 - 110	≤ 1.8m	2	3
90 - 110	> 1.8m ≤ 3m	3	4
180 - 230	≤ 1.8m	6	4
180 - 230	> 1.8m ≤ 3m	6	5
270	≤ 1.8m	7	4
270	> 1.8m ≤ 3m	7	5

340	As described for 1 of 230mm plus 1 of 110 mm, or 3 of 110 mm		

Lintels in 270mm thick cavity walls shall be in 2 widths with joint between the two arranged directly over the window or frame below, and the brickwork above shall be built in 2 x ½ brick thickness with inner face of the outer thickness covered with sheeting as for damp-course, the full length and depth of lintels, and taken down between the 2 widths of pre-stressed lintels. The cavity to height of lintel courses shall be filled with Class E concrete, and where cavities continue above the lintel courses the sheeting shall be taken up and turned on to top of first course of brickwork to inner thickness of wall above the lintel course. The sheeting is not required in lintels protected from the weather.

PS4.2.30.22 Bagged finish to brickwork

Bagging to walls is to be carried out after the mortar in joints has set. The wall surfaces shall be rubbed over with wet rough sacking until all joints and crevices are filled up and an even surface is obtained. Cement grout shall be added if necessary to fill up the joints and crevices.

PS4.2.30.23 Raking out for and pointing flashings

Brick joints shall be raked out where required for fixing cover flashings and flashings, which shall be pointed in 3:1 cement mortar.

PS4.2.30.24 Mastic pointings

Where steel door and window frames are specified to be pointed with mastic compound, they shall be pointed all round externally with an approved waterproofing compound of such composition that it will not stain surrounding surfaces and that it will adhere steadfastly, remain plastic without sagging or running, be capable of accommodating any normal movement of the joint sealed, and will receive paint without "bleeding". The pointing material shall be forced into the joints, which shall have been previously prepared to receive same, by means of a pressure gun or by other suitable method, all in accordance with the manufacturer's instructions.

PS4.2.30.25 Building in

Ends of timbers, holdfasts, cramps, gratings, air bricks, dowels, etc. shall be built-in in cement mortar.
Door and window frames, lift door frames and the like shall be set up in position for building in and securely strutted to prevent distortion whilst the brickwork, lintels, etc. are being built.

Pressed steel door frames and lift door frames shall be grouted in solid at back with cement mortar as the work proceeds. Wood slips, fixing bricks, hoop iron roof ties, etc. shall be built in as the work proceeds.

PS4.2.30.26 Securing of roofs

Roof trusses shall be fixed at each support to walls with ties of 1.6mm thick galvanised hoop iron, 32mm wide, built 750mm deep into brickwork or embedded 300mm deep into concrete or wrapped around bottom layer of reinforcing in a reinforced concrete beam and wrapped over truss and fixed with four galvanised nails, 40mm long

PS4.2.30.27 Bedding

All door, window and similar frames shall be bedded and pointed in 1:3 (cement:sand) cement mortar. All wall and floor plates shall be set true and level and bedded in 1:6 (cement:sand) cement mortar.

PS4.2.30.28 Pointing of brickwork

Clean and point at the end of each working day all exposed masonry work including nail holes, existing brickwork shall be pointed, thus Pointing, repairing eroded and cracked mortar joints, shall be executed on existing and new brick where and when shown by the Employer's Agent or his duly authorized representative. All disintegrated joints (erosions and/or cracks) shall be cleaned of all existing mortar for the full depth of the deterioration but not less than to a depth of 25mm. All joints shall be:

a) brushed and washed (under pressure) clean prior pointing.
b) kept wet during pointing; and
c) pointed to the full depth of the cut, tooled to match existing.

Steel door and window frames shall be carefully pointed all round and made perfectly watertight.

Joints greater than 25mm shall be stage-pointed.

PS4.2.30.29 Faced brickwork

Faced brickwork shall be built fair and pointed with a keyed or recessed joint as specified. Keyed joint shall mean that the joints are to be pointed with a round jointing tool, well pressed into the joints as the work proceeds.

"Recessed joint" shall mean that the joints are to be square recessed to a depth of approximately 6mm formed with a rectangular jointing tool well pressed into the joints as the work proceeds.

Facing bricks shall be sorted by the brick manufacturer at his yard or by the Contractor on the site to ensure that proper mixing of the bricks within the colour range of each type of facing brick being used is obtained. Sudden changes in the general colour of face work in any 1 types of facing brick shall not be acceptable.

PS4.2.30.30 Fibre cement sills

Sills shall where in any way possible be in single lengths, cut between reveals, fitted with fixing lugs and solidly bedded in 1:3 (cement:sand) cement mortar with a slight projection beyond the finished wall face below.

Internal sills shall be level. External sills shall be set sloping on cut brickwork.

PS4.2.30.31 Installation of electrical service

The installation of electrical services, where such service is being provided, the Contractor shall embed in the concrete, as the work proceeds, all conduits, boxes, etc., which will be fixed in position by the electricians, and must reduce all required chases and holes in walls for conduits and form recesses in walls for distribution boards, all in the positions directed. Alternatively, distribution boards may be built into walls as the work proceeds, providing prior approval are obtained from the Employer's Agent.
The Contractor shall afford every facility and shall render reasonable assistance to the electricians in carrying out their work and shall make good where necessary, in all trades, after installation has been completed.

Chases, holes and recesses required in walls shall be cut and formed as follows:

- vertical chase for single conduit.
- vertical chase for two conduits.
- vertical chase 150mm wide and 110mm deep for conduits.
- vertical chase 250mm wide and 110mm deep for conduits.
- vertical chase 380mm wide and 110mm deep for conduits.
- vertical chase 560mm wide and 110mm deep for conduits.
- horizontal chase for single conduit.

- Holes 25mm diameter or knocking out bricks and filling space and making good after a pipe has been fixed through a wall.

Recesses for distribution boards shall be:

Width (mm)	Height (mm)	Depth (mm)
330	330	110
455	330	110
635	330	110
610	660	110
610	910	110

PS4.2.30.32 Cable sleeves

Provide under buildings where required 100mm diameter vitrified clay, pitch fibre or plastic pipes as sleeves for electric cable taken up to floor level in cable duct or switch cupboard with easy bends. The pipes shall be as specified for drainage including laying and jointing.

PS4.2.30.33 Patching brickwork

Patching of existing walls and closing of openings shall be as shown. All brick shall be keyed to the existing or stepped every course with all surfaces flush with the existing surface and all joints kept online.

PS4.2.30.34 Protect face brickwork

All face brickwork, stonework, tiling, etc. liable to damage shall be covered up and protected during the progress of the remaining work and any damage done shall be made good to the satisfaction of the Employer's Agent or his duly authorized representative.

All face brickwork, stonework, tiling, etc. shall be cleaned down as the work proceeds and shall be covered up with paper, pasted on, or by other approved means where necessary to prevent soiling of the surfaces during the progress of the remaining work. At completion of the works the coverings shall be removed and the surfaces again cleaned down to the satisfaction of the Employer's Agent or his duly authorized representative.

PS4.2.30.35 Cleaning

On completion of the work all masonry must be carefully cleaned down, removing all large particles of mortar with a putty knife or chisel. If acid is required for the removal of mortar stains (see note below), it shall be hydrochloric (muriatic) and not stronger than one volume of the commercial acid to nine volumes of water. Before the acid solution is applied, the surface should be thoroughly soaked with clear water; otherwise, the mortar stain may be drawn into the pores causing a permanent dulling of the rich natural masonry colors. The acid solution should be applied with a long-handled stiff fiber brush, with proper precautions as to covering of clothing, hands and arms to prevent burns. It should not be placed over an area greater than 1.5 to 2.0m^2 before the wall is again thoroughly washed down, or preferably hosed, with clear water immediately after cleaning. It is important to remove all trace of the acid before it attacks the mortar joint. All frames, trim, sills, or other installations adjacent to the masonry must be carefully protected against contact with the acid solution.

All paving shall be thoroughly cleaned off after laying to remove all traces of mortar and other substances, covered up and protected from damage during the progress of the works and again
cleaned off at completion.

Any detergent or other materials used in the cleaning down of face brickwork etc. shall be of such nature that it will not harm adjoining paint and other finishings in any way.

***NOTA BENE**: Whenever possible, smooth, light-colored units should be scrubbed with warm water and soap powder in lieu of acid cleaning.*

PS4.2.31 Plastering
PS4.2.31.1 Lime

Lime shall be hydrated plaster lime complying with the requirements of SANS 523.

PS4.2.31.2 Cement

Cement shall be as specified.

PS4.2.31.3 Sand

Sand for plaster shall be as specified.

PS4.2.31.4 Form key to concrete for plaster finish

All surfaces of concrete receiving plaster or similar finishes shall be well wetted, and wire brushed immediately after the formwork has been removed and slushed over with 2:1 cement grout to form key for the finish, all to the approval of the Employer's Agent or his duly authorized representative. The slushing shall be allowed to set hard before any finish is applied

Where smooth formwork has been used, particular care shall be taken in forming the key for plaster as described in applicable concrete specifications.

PS4.2.31.5 Lime plaster

a) One coat work on walls
Lime plaster for 1 coat work on walls shall be composed of 4 parts (volume) of sand and 1 part (volume) of lime. The material shall be mixed dry until of uniform colour, water shall then be added and the mixture turned over until the ingredients are thoroughly mixed.
Lime plaster not used on the day it is mixed, shall be kept moist until required for use by covering with wet sacks or by other approved means.

b) Two coat work on walls
The rendering coat shall be of compo plaster well scratched over to form key for the setting coat. The setting coat shall be composed of 1 part hydrated putty plaster lime, complying with the requirements of SANS 523 and 1 part fine washed sand, to which retarded hemi-hydrate hardwall finishing gypsum plaster shall be added in the proportion of 1 part of gypsum plaster to 4 parts of sand, all proportioned by volume.

The gypsum plaster shall not be added to the mixture until the setting coat is to be applied and shall then be thoroughly incorporated into the mixture and used immediately.

c) Two coat work on metal lathing
The rendering coat shall be of compo plaster to which sisal shall be added in the proportion of 4kg of sisal to 1m^3 of plaster. The rendering coat shall be well scratched over to form a key for the setting coat.

PS4.2.31.6 Compo plaster

Compo plaster shall be composed of 10 parts (volume) of sand, depending on the quality of the sand available, 1 part (volume) lime and 1 part (volume) cement.

The lime and sand shall be mixed dry until of uniform colour and then mixed wet. Approximately ½ hour before use, add the cement and any additional water as may be required and remix until thoroughly mixed.

Compo plaster shall be produced in such quantities as can be used whilst remaining workable as no compo plaster that has become unworkable shall be used in any way.

PS4.2.31.7 Cement plaster, one coat work on brickwork:

Cement plaster for 1 coat work on brickwork shall be composed of 4 parts of sand to 1 part of cement for internal work and 5 parts of sand to 1 part of cement for external work, all measured by volume, and mixed as described for cement mortar in sub-clause 4.2.19.9 (Cement mortar).

PS4.2.31.8 Thickness of plaster

Plaster on walls shall be not less than 12mm or more than 20mm in thickness and plaster on concrete ceilings and beams shall not be less than 9mm or more than 16mm in thickness.

PS4.2.31.9 Application of plaster

Walls shall be well wetted before plastering is commenced.

The surfaces of plastered walls internally shall be steel trowelled to a smooth, even and true finish, unless otherwise specified.

All external plaster shall be finished to a true and even surface with a wood float, unless otherwise specified. All plaster surfaces shall be free from blemish.

Plaster shall be returned into reveals and soffits of openings and all angles shall be true and straight with salient angles slightly rounded.

The rendering coat of plaster in two coat work shall be approved by the Employer's Agent or his duly authorized representative before the setting coat is applied and notice shall be given to him when the plaster is ready for inspection.

All cracks, blisters and other defects shall be cut out, made good and the whole left perfect at completion.

PS4.2.31.10 Granolithic finish

Granolithic finish to floors, treads of steps, thresholds and similar horizontal surfaces shall be not less than 25mm thick, composed of 2 parts (volume) granite, or other approved hard stone chippings, or approved hard coarse sharp washed granitic or quartzitic river sand, graded up to a maximum size of 5mm, 1/6 part clean pit sand screened through a 2.4mm mesh sieve and 1 part (volume) of cement, and hand or mechanically steel trowelled to a true and smooth surface.

The material must test between 30 and 35MPa. No dry cement powder or grout shall be applied to the surface.

The granolithic shall be laid before the concrete subfloor has matured otherwise the exposed surface of the concrete shall be thoroughly cleaned with a wire brush and a coat of neat cement grout applied immediately before the granolithic is laid.

The granolithic shall be laid in panels not exceeding 20m^2 in area and joined to lines of panels with
V-joints as directed. The length of any panel shall not exceed 4.5m and wherever possible the joints between the panels shall coincide with any joints in the concrete sub-floor.
Where granolithic is to be tinted, it shall be laid in two thicknesses in one operation, the lower thickness being brought up to within 6mm of the finished level and the upper thickness, into which the requisite quantity of approved colouring material has been mixed, shall be laid. NO DUSTING OF
COLOURING MATERIAL SHALL BE ALLOWED.

Granolithic finish to stair risers, sides of kerbs and other vertical surfaces shall be not less than 12mm thick.

Exposed salient angles of granolithic shall be neatly rounded to approximately 20mm radius.
All granolithic work shall be carried out by experienced workmen and shall be protected from injury caused by rain or other extremes of weather for 12 hours after being laid, and against drying out too rapidly whilst hardening by covering with wet sacks or other suitable material and shall be protected from other injury and discoloration during the progress of the remaining work.

Edges of granolithic floors adjoining other floor finishes, edges of margins, etc. shall be true and sharp, all protected by fixing temporary wood strips which shall remain in position until laying of the adjoining flooring material is commenced.

PS4.2.31.11 Reedings to steps and upper surfaces

The treads of steps and upper surfaces of external thresholds finished with granolithic, or sand-cement finish shall be rendered non-slip by reeding same near front edge for a width of 100mm and stopped 100mm from ends.

PS4.2.31.12 Polishing of granolithic

All tinted granolithic finishes to floors, steps, thresholds, skirting, etc. shall at completion of all other work be twice polished with wax floor polish of an approved type.

PS4.2.31.13 Screeding to floors

Concrete sub-floors finished with wood mosaic, semi-flexible tiles and fully flexible vinyl sheeting and tiles and similar finishes shall be screeded with 1:3 (cement:sand) cement plaster of thickness required, but in no case less than 12mm, all steel trowelled to true

and smooth surfaces. The sand used in the plaster shall be of such fineness as will allow for the screed being trowelled to a surface suitable to receive the finishes.

The screeding shall be laid before the concrete sub-floors have matured, otherwise the exposed surfaces of the concrete shall be thoroughly cleaned with a wire brush and a coat of neat cement grout applied immediately before the screeding is laid.

The screeding shall be laid in good time, but no finishes are to be laid if the screed exceeds 70% moisture content when measured with a hygrometer.

No traffic shall pass over, nor shall any building operations take place on the screeding unless a proper protective covering is first provided.

***NOTA BENE**: A similar process shall be applicable where manholes or chambers are screeded.*

PS4.2.31.14 Sand-cement finish

Sand-cement finish to treads of steps, thresholds, etc. shall be of 1:2 (cement:sand) cement plaster not less than 20mm thick and steel trowelled to true and smooth surfaces. Finishes to risers of steps, sides of kerbs and other vertical surfaces shall be not less than 12mm thick. Exposed salient angles shall be neatly rounded to approximately 20mm radius.

PS4.2.31.15 Natural aggregate concrete floor hardener

a) Definition
All natural aggregate hardeners for concrete floors shall consist of a factory prepared blend of clean, properly graded and oven dried natural aggregate, Portland cement and chemical aids, all suitable for monolithic application to the surface of newly placed concrete. Where required the hardener may contain certain compatible pigments for tinted floors.

b) Quality testing
   i) Sampling:
   A minimum of 1% of every 5 tons of production shall be sampled and factory tested for water demand, compressive strength and proportioning.

   ii) Compressive strength and water demand
   Mix with sufficient water to give a slump of 20 to 25mm in a 35 x 90 x 75mm high slump cone filled in three layers; tamping each layer with 15 strokes of a 16mm diameter rod, shall give the following minimum compressive strengths when tested in a 70mm mortar cube vibrated for 3mm on a vibrating table and stored in a curing room or tank at 22 to 25°C and not less than 90% humidity:
   - at 7 days : 50 MPa
   - at 28 days : 70 MPa

iii) Test records:
Each quality test record shall be so referenced that the batch numbers on bags of the product may be traced back to the relevant quality control report. Such reports shall be available for inspection by the Employer's Agent or his duly authorized representative for up to 1 year after manufacture.

c) Curing
As an integral part of this hardener, a membrane curing compound, which must be both compatible with the floor hardener offered and comply with the ASTM C.309 Type 1 specification for moisture retention, shall be used.

PS4.2.31.16 Ferrous aggregate concrete floor hardener

The ferrous aggregate hardener for concrete floors shall be a factory prepared blend of clean, properly graded ferrous metal aggregate, Portland cement and chemical aids for application and hardening, ready to apply as a dry shake to the surface of newly placed concrete before finishing.
The ferrous aggregate shall be guaranteed to be free of matter deleterious to concrete, such as oil and non-ferrous particles and shall be treated for rust inhibition. Where required it may contain compatible pigments for tinted floors.

PS4.2.32 General product requirements

PS4.2.32.1 Local content

Preference shall be given to materials fully manufactured in South Africa with South African raw materials.

PS4.2.32.2 Site service

The manufacturer shall be expected to supply samples free of any other additional charge, and the services of a qualified technical representative on all of the building sites pertaining to the particular contract in order to train the placing team in the correct application methods of the product during initial placing upon 1 weeks' notice.

Circumstances may necessitate follow-up inspections.

PS4.2.32.3 Shelf life

The shelf life of the offered product shall be stated, and the expiry date displayed on each bag. The Contractor shall ensure that the product supplied will survive the Contract Period or replace the product at his cost.

PS4.2.32.4 References

The Contractor shall submit names and locations of projects in South Africa where the offered product has been in successful use for a period of at least 5 years under similar conditions and at similar rates. The Contractor shall:

i) make arrangements with the project owners for access for such visits, if the Employer's Agent or his duly authorized representative wish to inspect such reference project sites.
ii) provide an acceptable alternative at the same accepted financial rate of the original proposed product, should the Employer's Agent or his duly authorized representative find the product unacceptable.

PS4.2.32.5 Approved products

Only products that have been tested and which have been approved by the SANS shall qualify.

PS4.2.32.6 Application rates

As specified by the manufacturer.

PS4.2.32.7 Control testing

The Contractor shall be required to conduct control testing as and when requested by the Employer's Agent or his duly authorized representative, proving the quality of the product used.

PS4.2.33 Specific work-related instructions
PS4.2.33.1 Contractor's responsibility

The Contractor shall be held responsible for damage to street or road surfaces, kerbing, stormwater drainage channels (gutters), existing utilities, etc. that result from his negligence during any survey. The Contractor shall repair, at his cost, any damage resulting there from, which shall be subject to approval by the owner of such asset and the Employer's Agent or his duly authorized representative.

PS4.2.33.2 No disturbance

The Contractor shall be required to perform Works at all conduits with limited and approved disturbance to the existing service provision. Should the Contractor decide to use a stringing method to survey the conduit, the stringing lines shall not be left in the conduit for more than 5 days or without consent of the Employer's Agent or his duly authorized representative.

PS4.2.33.3 Immediate danger

All obstructions, cracks, irregularities must be fully surveyed and documented. The Contractor must inform the Employer's Agent immediately of any obstruction

encountered, locations of hazardous atmosphere, or conduits that are in immediate danger of structural failure. Where possible:

a) the survey shall be done from the opposite side, whilst appropriate health and safety measures are adhered to, so that the extent of the danger can be assessed.

b) the position shall be clearly and accurately marked, to allow operations and maintenance to easily locate the position.

PS4.2.34 Survey reporting

PS4.2.34.1 CCTV reporting

The Contractor shall:

a) make use of a computer programme to produce CCTV survey reporting, including providing video recordings in one of the following digital formats: mpg, avi, mov or other formats agreed with the Employer's Agent or his duly authorised representative. However, the Contractor shall ensure that the Employer and Employer's Agent are provided with all software to view recordings and print still images from the recordings. Any once-off or recurring fees to use such software shall be the account of the Contractor. The Employer prefers that recording be in MPEG2 format.

Each digital file shall contain the file name with a maximum of 64 characters according to the following:

i) <Contract number>
ii) E <Asset number>
iii) F <From asset number>
iv) T <To asset number>
v) <Street Name>
vi) M <Measured length>
vii) I <Inspected length>
viii) <inspection direction: DS or US>
ix) <letter designating inspection sequence>.MPEG

e.g., JW…… E5329 F5328 T5350 BERRY M100.0 I39.2 US B.MPEG indicates that this is the second or "B" partial inspection of this entity, 39.2m long.

All required header information fields shall be completed and verified for correctness by the Contract authorised manager. The software used to produce the survey report shall not allow the operator to continue inputting information until the preceding field has been completed. The report shall be machine printed and presented according to the WRC MSCC.

The survey report shall identify major defects and shall include photographs and video prints as specified in clause PS5.2.22 (Photographs and video prints).

b) take reference to the conduit grading (where appropriate) as per the WRC MSCC.

c) ensure that each Contract CCTV surveyor shall maintain an accurate record of his survey results and accuracy ratings to be signed by the Employer's

Agent or his duly authorised representative. The original copies of the records shall remain with the Employer's Agent or his duly authorised representative to be submitted to the Employer as part of the Contract Close-out report.

PS4.2.34.2 Survey report drawings

The Contractor shall submit with his survey report(s) a combined set of drawings highlighting the following minimum requirements.

a) Water and sewer conduits
Drawings shall unambiguously indicate the location, size, shape, material, and condition of all surveyed water and sewer conduits, with particular reference to:
i) condition grading of conduit;
ii) any previous rehabilitation and/or repairs executed;
iii) required point repairs; and
iv) the location and type of sewer blockages cleared or not cleared.

b) Water and sewer infrastructure Drawings shall unambiguously indicate the location of all surveyed infrastructure, i.e. water and sewer manholes and sewer backdrops, with particular reference to:
i) the type or water and sewer manhole cover and frames (hinged or non-hinged);
ii) whether sewer manhole was found in an open or closed position;
iii) the location and type of sewer blockages cleared or not cleared;
iv) rehabilitation and/or repairs required; and
v) any previous rehabilitation and/or repairs executed.

PS4.2.34.3 Report submission requirements

The Contractor shall submit to the Employer's Agent survey reports as follows:

a) within a maximum 5 days after successful completion of the survey of a section of conduits, 2 copies of the report per item (unless specified otherwise), respectively for use by the Employer's Agent and the Employer.
i) 2 x copies of the printed survey report;
ii) 1 x copies of the printed photographs and video prints (as specified);
iii) 2 x CDs each containing the identical survey report information as in the printed copies (as sated above); and
iv) 2 x DVDs each containing the digital video recording. The Contractor shall ensure that entire surveys per manhole length shall be contained on a single DVD. Thus, where possible, reverse set-up inspections shall be recorded immediately after the original inspection.

The Employer's Agent requires that all of the sectional surveys of a single conduit be logically grouped together in a single report.

b) submit to the Employer's Agent different survey reports (number of copies as specified above), as he may require different sections of the survey to be conducted using different survey methods.

c) submit to the Employer's Agent separate survey reports (number of copies as specified above) for any part of the complete survey, this shall be noted in

writing by the Employer's Agent prior to the commencement of that section of the work.

d) comply with reasonable requests from the Employer's Agent to supply the information on some parts of the survey whilst the complete survey is still in progress.

e) submit a report that contains a summary of the key surveying findings, including but not limited to:
   i) manhole references, with a note indicating whether the survey was successfully conducted or not, and stating reasons for unsuccessful surveys;
   ii) conduit diameter and lengths;
   iii) conduit material; and
   iv) a conditional assessment ranking of the various conduit or appropriate sub-sections thereof.

PS4.2.34.4 Contractual sign-off

The Contractor shall ensure that all reports submitted to the Employer's Agent, or his duly authorised representative are formally signed-off by the most senior Contractor designated manager, who shall be suitably qualified (preferably the Contract authorised signatory) as an indication that the report findings are an accurate account of the condition of the conduit or other infrastructure surveyed.
No report shall be accepted for review and shall be considered incomplete by the Employer's Agent or his duly authorised representative if it is not formally signed by the most senior Contractor designated manager.

PS4.2.38 Maintain sewage flow

The rate shall include the complete (labour, qualified operators, material, plant and equipment) cost for maintain sewerage flow for the duration of contract

Unit: Sum

The Contractor shall clearly specify the equipment and method proposed.

PS4.2.39 Cleaning of conduits

Unit: m

The rate shall include the complete (labour, qualified operators, material, plant and equipment) cost for the proper cleaning of conduits in manhole lengths for various conduit sizes and shapes. Including provision and operation of all cleaning equipment and accessories, regular calibration of equipment, all the required testing equipment, safety equipment (including that required for the Employer's Agent or his duly authorised representative's sole use), traffic accommodation equipment, collections of arisings, containers for the removal and disposals of arisings, video prints, photograph prints, card-index file(s) and reporting.

Cleaning shall take place prior to any CCTV camera survey and/or implementation of the works and once again after the works have been implemented (including all trenchless applications).

PS4.2.40 CCTV surveys

Unit: m

The rate shall cover the cost for the supply or hire, operating of the CCTV equipment and providing DVD for the Employer's Agent.

Manhole repair and/or rehabilitation

PS4.2.41 Manhole bottom repair and/or replacement

The rate shall include the complete (labour, qualified operators, material, plant and equipment) cost for the successful repair and/or rehabilitation of existing manhole bottoms. Including provision and operation of all equipment and accessories, provision and application of all repair materials, safety equipment (including that required for the Employer's Agent or his duly authorised representative's sole use), traffic accommodation, manhole invert protection, and required manhole surface preparation, waterproofing, testing and reporting.

a) Repairs without channel replacement
Unit: m^2
b) Channel replacement
Unit: No

PS4.2.42 Step iron repair and/or replacement

Unit: No

The rate shall include the complete (labour, qualified operators, material, plant and equipment) cost for the successful repair and/or rehabilitation of manhole step irons. Including provision and operation of all equipment and accessories, removal of existing step irons, disposal of existing defunct step irons, cleaning and installation of existing step irons, provision and installation of new step irons, safety equipment (including that required for the Employer's Agent or his duly authorised representative's sole use), traffic accommodation, manhole invert protection, any required manhole surface preparation and reporting.

a) Re-instatement of existing step-irons
b) New step-irons

PS4.2.42.1 Stopping active manhole wall leaks

Unit: No of manholes

The rate shall include the complete (labour, qualified operators, material, plant and equipment) cost for the successful sealing of active wall leaks in manholes. Including provision and operation of all equipment and accessories, provision and application of all repair materials, safety equipment (including that required for the Employer's Agent or his duly authorised representative's sole use), traffic accommodation, manhole invert protection, any required manhole surface preparation and reporting.

PS4.2.43 Surface stabilisation of concrete manholes (where necessary)

Unit: m^2

The rate shall include the complete (labour, qualified operators, material and equipment) cost for the successful stabilisation of concrete manholes. Including provision and operation of all equipment and accessories, provision and application of all repair materials, safety equipment (including that required for the Employer's Agent or his duly authorised representative's sole use), traffic accommodation, manhole invert protection, any required manhole surface preparation and reporting.

PS4.2.44 Patching masonry walls

Unit: m²

The rate shall include the complete (labour, qualified operators, material, plant and equipment) cost for the successful patching of existing masonry walls in manholes. Including provision and operation of all equipment and accessories, provision and application of all patching materials, safety equipment (including that required for the Employer's Agent or his duly authorised representative's sole use), traffic accommodation, manhole invert protection, any required manhole surface preparation and reporting.

PS4.2.45 Manhole waterproofing

Unit: m²

The rate shall include the complete (labour, qualified operators, material, plant and equipment) cost for the successful waterproofing of existing masonry and concrete manholes. Including provision and operation of all equipment and accessories, provision and application of all waterproofing materials, safety equipment (including that required for the Employer's Agent or his duly authorised representative's sole use), traffic accommodation, manhole invert protection, any required manhole surface preparation and reporting.

PS4.2.46 Replace benching in existing manholes

Unit: m²

The rate shall include the complete (labour, qualified operators, material, plant and equipment) cost for the successful replacement of benching in existing manholes. Including provision and operation of all equipment and accessories, provision and application of all repair materials, safety equipment (including that required for the Employer's Agent or his duly authorised representative's sole use), traffic accommodation, manhole invert protection, and required manhole surface preparation, waterproofing, testing and reporting.

PS4.2.47 Reseal existing manholes

The rate shall include the complete (labour, qualified operators, material, plant and equipment) cost for the successful resealing of existing manholes. Including provision and operation of all equipment and accessories, provision and application of all repair materials, safety equipment (including that required for the Employer's Agent or his duly authorised representative's sole use), traffic accommodation, manhole invert protection, and required manhole surface preparation, waterproofing, testing and reporting.

a) Masonry Wall
   Unit: m²
b) Pre-cast concrete rings
   Unit: No.

PS4.2.48 Removal of damaged pipes

All pipes that have been removed from the excavations are spoiled within 48 hours of excavation failing which the Employer's Agent shall be entitled to suspend work under the Contract.

The rate shall include the complete (labour, disposing, plant and equipment) cost for the removal of such material.

Unit: m

PS4.2.49 Trenchless technology

PS4.2.49.1 Supply and Installation of pipe through pipe cracking

Unit: m

The rate shall include the complete (labour, qualified operators, material, plant and equipment) cost for the successful pipe cracking of the pipe, installation and supply of pipes of various diameters, jointing of pipe, (launching and reception pits shall be covered under earth works). The rate shall also Include the provision and operation of all equipment and accessories, provision and application of all materials, safety equipment (including that required for the Employer's Agent or his duly authorised representative's sole use), traffic accommodation and testing and reporting.

PS4.2.49.2 Supply and Installation of pipe through Horizontal Direction Drilling (HDD)

Unit: m

The rate shall include the complete (labour, qualified operators, material, plant and equipment) cost for the successful drilling of the pipe, installation and supply of pipes of various diameters, jointing of pipe, (launching and reception pits shall be covered under earthworks). The rate shall also Include the provision and operation of all equipment and accessories, provision and application of all materials, safety equipment (including that required for the Employer's Agent or his duly authorised representative's sole use), traffic accommodation and testing and reporting.

PS4.2.49.3 Manhole Plugging

Unit: No

The rate shall cover the plugging of manholes only during any operation within the pipeline. The rate shall be broken down pipe diameter ranges.

PS4.2.49.4 Over-pumping

Unit: hr

The rate shall cover over-pumping of the sewer lines. The items shall be broken down into different pipe diameter ranges and the maximum pumping rate for the pump shall be stated. This rate shall not include manhole plugging.

PS4.3 Plant and materials

The Contractor is required to provide all plant and materials necessary to carry out the works as specified and required. No additional allowances other than those already specified in the Schedule of Rates shall be allowed for with respect to plant and materials.

PS4.4 Engagement of Labour

PS 4.3.1 <u>Provision of a Temporary Workforce for the Contract</u>

The Contractor shall have regard for the stipulation laid down for all Labour-Intensive projects that he employs labour from the local community through the Labour Desk that has been established for this purpose.

The Labour Desk shall assist in identifying available local labour and, where available, semi-skilled labour as well as local sub-Contractors. The Labour Desk shall also assist and advise regarding conditions of employment, minimum wages, disputes and disciplinary procedures.

The workforce that is employed on Site shall consist of local labour where applicable, except for approved key staff, to the extent that is compatible with the requirements of Clause 4.11 of the General Conditions of Contract 2015 third edition.

The Occupational Health and Safety Act must be adhered to with reference to the safety of any employee irrespective of whether such employee is employed by the Contractor or by a local sub-contractor. Furthermore, a contract of employment must be signed between the Contractor and each of his employees and sub-contractors and between such sub-Contractors, and each of the sub-contractor's employees with clear reference to the following conditions:

- The minimum agreed wage rate per hour in respect of labourers;
- The agreed pay rate per unit of production where applicable;
- UIF and WCA payments;
- Minimum working hours per day;
- Start and end times of a daily shift;
- Lunch break times;

Company Policy regarding the following:

- Rain time
- No work no pay - sick, absent
- Disciplinary policy
- Grievance policy
- Method of payment
- Workers' clothing and safety equipment to be issued.
- The Contractor is required to show these items to the Employer's Agent for approval before construction commences.

PS 4.3.2 **Transportation of labourers**

The labour employed on this contract shall be local labour from the nearest local community. Transportation should be provided for the labourers from Site Office to where they are working and back to the Site Office.

PS 4.3.3 **Minimum wage for local labour**

Contractor to comply with the latest Government Gazzette: Basic Conditions of Employment Act 75 of 1997 from the Department of Labour.

PS 4.3.4 **Training**

The Contractor will be expected to provide formal training for the labourers. In this regard the labourer will be attending training for five days and the labourers should receive their full salary while on training. The Contractor is expected to have allowed for this in his rates.

PS4.5 Existing services

PS 4.5.1 Known services

Existing known services, both underground and overhead, are indicated on the drawings, but the positions of existing services on the drawings are not guaranteed nor does the Employer or the Employer's Agent accept any liability in this regard.

PS 4.5.2 Treatment of existing services

The Contractor must liaise with all relevant local authorities to satisfy himself that all relevant services have been located. At the commencement of the contract, the Contractor must hand excavate a distance 0, 5 metre on each side of the located service to expose it. The exposed service shall be identified and recorded on a drawing.
A copy of the drawing with all known services shall be submitted to the Employer's Agent before construction can commence in any road reserve. Once the exposed service is identified and recorded the excavation must immediately be backfilled. Re-excavation by hand at construction stage will not be measured in addition to normal trench excavation.
The Contractor shall retain full responsibility for establishing the exact positions of the various services in advance of any construction work. No allowance for delays or disruption shall be entertained unless the Contractor complies fully with the provisions of this clause regarding the establishment of the exact positions of the various services in advance of any construction work.

PS 4.5.3 Use of detection equipment for the location of underground services

The Contractor:
is responsible to provide his own equipment in order to determine the location of existing services and shall locate and expose existing services by hand.

PS 4.5.4 Damage to existing services

The Contractor:

Must make provision for the possible existence of numerous services within and in close proximity to the work areas shall take necessary steps to protect any existing services whatsoever against damage which may arise as a result his operations on site. Adequacy in terms of protection of existing services shall be at the discretion of the Employer's Agent. The Contractor is to make good the protection of and any breakages to existing services; must inform the relevant service provider immediately (within 2 hours of the incident) such that procedures for the re-instatement of the service can be effected, should he damage or break an existing service (whether known or unknown); shall bear the cost of the repair of damages to any service, the possible existence of which could reasonably have been ascertained by him in good time.

Under no circumstance is the Contractor to alter or in any way interfere with existing works or underground services unless authorised by the Employer's Agent.

NOTA BENE: Drawings indicating other existing services in the vicinity of the Works are not guaranteed as being accurate, as all other services may not have been recorded or properly recorded. It shall remain the responsibility of the Contractor to perform

preoperational work, to locate existing services in advance of the commencement of the Works.

PS4.6 Site establishment, facilities available and required

P.S4.6.1 General

In order to facilitate compliance with the General Conditions of Contract and Conditions of Contract the Contractor shall be required to set-up an individual construction camp. The size and functionality of the site camp shall be in relation to the individual Blocks and Sections. It is, however, expected that the Contractor would have made themselves aware on whether one or multiple site camps are required for the execution of the complete Contract Works.

The Contractor shall price accordingly and state so in their proposal. For the camp/s, the following shall apply:

a) The Contractor shall make arrangements with the relevant authority for a suitable site to establish a construction camp, storage, works offices, workshop/s, kitchen, and shelters for security personnel.

b) The Contractor shall note that only security personnel shall be permitted to remain in the campsite overnight.

c) Ablution facilities shall be provided for men and women separately. One toilet per twenty workers shall be provided. Such facilities shall at all times be maintained in a clean and hygienic condition. Toilets shall be screened from public view and their use shall be enforced.

d) Covered accommodation shall be provided for perishable or corrodible materials, fittings and the like and shall be adequate and suitable for their purpose. In the case of cement stores, they shall be well ventilated, weatherproof and waterproof with appropriate floors to keep the materials dry and freely aerated.

e) All such accommodation shall be subject to the approval by the Employer's Agent who shall have free access thereto at all times.

f) Temporary buildings and fencing are to be safe, neat and presentable and the surrounding areas must at all times be kept in a neat, clean and orderly condition for the duration of the Works.

g) It shall be the Contractor's responsibility to ensure that they are in compliance with all relevant laws and regulations as well as tribal requirements.

PS4.6.2 Site facilities required for Employer's Agent

a) Source of water supply: It will be the responsibility of the Contractor to make his own arrangements for the supply of water. Potable water is available in the area and the Contractor is to make the necessary arrangements for the provision of a metered point of supply with the Employer. The sum entered by the Contractor in the Bill of Quantities for provision of water shall be deemed to include full compensation for the procurement, transport, storage (where necessary), supply and application of water and for all the work necessary and incidental thereto for the various items of work where water is required for the purposes of the contract. The Employer does not guarantee the

availability, sufficiency or continuity of any supply and no claims in this regard will be considered.

The Contractor is to be aware of the fact that this Contract is to be carried close to a built-up environment and that, as such, excessive dust creation will be considered unacceptable by the local residents. The Contractor is to make provision for regular watering of the works in order to alleviate dust creation. During dry weather, or during periods when dust is created by the construction process, the Contractor will be required to water the works a minimum of twice a day, or as specified by the Employer's Agent. This is a requirement over and above the normal requirement for watering of the works.

b) Source of power supply: It will be the responsibility of the Contractor to make his own arrangements for the supply of electricity. The sum entered by the Contractor in the Bill of Quantities for the provision of power shall be deemed to include full compensation for the procurement and supply of powers to the works. The Employer does not guarantee the availability, sufficiency or continuity of any supply and no claims in this regard will be considered.

c) Contractor's camp: A suitable site for the Contractors camp will be identified prior to commencement by the Employer. The Contractor is to make the necessary arrangements for the payment of services to the Municipality where applicable. The camp site shall be kept clean and tidy, and at the completion of the contract shall be restored to its original condition at the Contractor's own cost, and to the satisfaction of the Employer's Agent. In order to facilitate compliance with the Conditions of Contract and the Specification, the Contractor may establish storage accommodation, works offices, workshops, mess-rooms, kitchens, shelters for watchmen, latrines, ablutions and the like in such positions and under such conditions as may be agreed by the Employer's Agent and indicated in the Addendum to the EMP.

Temporary buildings and fencing are to be neat and presentable, and the surrounding areas must at all times be kept in a neat, clean and orderly condition.

The Contractor shall not make any excavation without written permission of the Employer's Agent.

Covered accommodation for perishable or corrodible materials, fittings and the like shall be adequate and suitable for their purpose, and, particularly in the case of cement stores, shall be well ventilated, weatherproof and waterproof with floors raised off the ground, so as to keep the materials perfectly dry and freely aerated. All such accommodation shall be subject to the approval of the Employer's Agent who shall have free access there at all times.

In addition to the above, the Contractor shall provide one toilet per 20 workmen. Portable toilet facilities shall be made available to workers of both male and female genders, the number provided to be in proportion to the ratio of the sexes. The toilets shall be located in the vicinity of the work site, shall be screened from public view and the use thereof shall be enforced. The Contractor shall, where applicable, make the necessary arrangements for the regular removal of night soil.

The Contractor may not house members of his permanent staff except for a security guard at the site and is to make the necessary arrangements for the transport of his staff members to and from the site on a daily basis. As the

Contractor's Camp may be located in close proximity to a residential area, attention to noise levels, particularly after hours, will be essential.

d) Site facilities required for Employer's Agent and others: The requirements of the Employer's Agent's Site Establishment are detailed in Project Specification PSA and PSAB.

The Contractor shall provide the following office facilities at his main site camp for the Employer's Agent and others:

- One office for the Employer's Agent's Representative.
- Temporary office accommodation to suit his own requirements.
- Covered parking facilities for two (2) cars for the Employer's Agent's Representative.

A cell phone will be required for the sole use of the Employer's Agent's Representative. The Contractor shall be responsible for the payment of calls related to the Contract made by the Employer's Agent's Representative, on this mobile phone, during the course of the Contract. A Telkom ADSL line with modem facilities shall be provided on site and be available for the sole use of the Employer's Agent's Representative at all times.

***NOTA BENE**: Where the Contractor intends utilising an existing camp (as part of another project), own office and/or storage facilities or facilities of the Employer, proof must be provided as to how Preliminary and General costs are charged on this Contract and what the current arrangement with the other employer or this Employer is with regard to use of such facilities.*

PS4.7 Site usage

PS4.7.1 Work on private or state property

The Contractor is to confine his activities strictly to the working area defined as being within 10 metres on either side of the pipelines, spoil sites and the direct access roads to these. He shall not encroach upon any roadway except with the prior approval of the Employer, in writing. The Contractor shall, throughout the Contract, take adequate precautions to protect all existing services from damage whether or not they have been pointed out to him.

Shallow sewer connections are to be found at the rear of the mid-block latrines. Particular care shall be exercised when excavating behind these structures. Underground electric cables are to be found on all erven at depths of between 75 and 1000 mm. Typically, these cables are at a distance of up to 1200 mm parallel to the erf boundaries and perpendicular to the common boundaries where they connect to the houses. Cables may also be encountered along the boundary behind the latrines. Particular care should be exercised when excavating in the vicinity of these cables.

The Contractor shall, as soon as is practically possible, inform the Employer's Agent of any damages to services and shall not repair any such damage unless instructed to do so. The Contractor shall be responsible for making good, at his own cost and to the satisfaction of the Employer's Agent, all damage caused by him to buildings and other improvements to properties.

Should the Contractor consider that damage to buildings and structures is unavoidable in the execution of any portion of the Works, he shall obtain the approval of the Employer's Agent before proceeding with the work. Where damage is noticed before commencement

of work on that erf, this should be reported to the Employer's Agent in order to prevent a possible liability claim from the owner.

PS4.7.2 Site safety and precautions against nuisance

The Works are to be conducted in an urban area where high volumes of pedestrian and vehicular traffic may prevail. The watching, barricading, lighting and traffic control on site shall be carried out in strict compliance with these specifications. The Contractor shall ensure that all safety measures are strictly adhered to. The Contractor shall ensure that excavations on sidewalks within the road reserves or within the erven, do not at any time present a safety hazard to pedestrians. All excavations that remain open overnight are to be adequately protected.

The Contractor shall provide all safety materials and equipment necessary for barricading and safeguarding the excavations. The safety of staff and labour involved with the Works and the security of installations, plant and equipment is of major concern and need special attention during the execution of the Works.

Plant used on the Works shall be as efficiently silenced as possible and noisy operations will be permitted only between the hours of 07:00 and 17:00. Any work outside normal hours will be permitted only on the written authority of the Employer's Agent. Wherever excavations or loading of material is liable to form dust, an effective method of spraying water over the excavated area and loaded material shall be instilled. Any rock or debris falling from trucks on the roads shall be removed immediately. Precautions shall be taken to prevent fouling of public roads or private surfaces. The Employer's Agent may order the Contractor to broom off and clean roads or surfaces where debris may constitute a danger to the public or a nuisance to the owners.

PS4.7.3 Work on live sewer mains

Every effort will be made by the Employer to furnish the Contractor with all available information regarding existing reticulation systems. Such information is given in good faith. Actual conditions in the field may, however, vary from the records upon which information is based. The Contractor must allow in his programme for delays when working on live mains and, as far as possible, such work should not be on the critical path of any programme and every effort must be made to have alternative work available.

PS4.7.4 Work outside normal working hours

In accordance with General Conditions of Contract Clause 5.8.1, certain work may only be done outside normal working hours. Such work shall be undertaken solely at the discretion of the Employer's Agent who shall, from time to time, issue advance orders in writing to the Contractor detailing the work to be undertaken. Work undertaken, as ordered, outside normal working hours shall be measured and paid for at the rates applicable to each and every item carried out as scheduled.

Normal working hours shall be defined as between 07:00 and 17:00 Mondays to Fridays.

Where the Works are conducted within the road reserve of major arterial roads, the contractor's operations will be restricted to out-of-peak traffic periods (typically 09:00 to 15:30) or as determined by the Traffic Department. The Contractor shall co-ordinate his activities in such a manner that only minor operations that are non-disruptive to traffic are carried out during peak traffic periods. Should the Contractor choose to work outside

normal working hours without having been ordered to do so by the Employer's Agent, permission will not be unreasonably withheld but all additional costs arising out of such work shall be entirely to the Contractor's account.

PS4.8 Permits and wayleaves

The Contractor will be required to obtain permits and wayleaves from all the applicable Service Providers within the jurisdiction of the City of Johannesburg, thus including the following services: roads and stormwater (JRA), bulk water supply (Rand Water), electricity (Eskom and City Power), gas (Egoli Gas), telecommunications (Telkom/OpenServe), and the like.
The Employer will assist the Contractor to obtain clearance from the various departments with services that are likely to be affected by the Contract. It is, however, the Contractor's responsibility to obtain final permit and wayleave approval according to applicable procedures and specifications. In the case of JRA, this will be as per the CoJ COP. Further, a processing fee per wayleave will be payable to cover the cost of processing and approval of the JRA wayleave applications. If clearances from various service providers and wayleave from JRA expires prior issuing of completion certificates, it will be the responsibility of the contractor to re-new all wayleaves and permits.

All associated costs to obtain permits and way-leaves 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.

PS4.9 Alterations, additions, extensions and modifications to existing works

The Contractor shall, within 20 working days or 10 % of the construction period after taking possession of the site (whichever is the lesser), satisfy himself that the dimensional accuracy, alignment, levels and setting out of existing structures or components thereof are compatible with the proposed works, and notify the Employer of any areas of dissatisfaction.
The Contractor shall, on becoming aware of a defect in existing works which will have an impact on the current works, notify the Employer of such a defect without delay.

PS4.10 Inspection of adjoining properties

The Contractor shall, before commencing with works which have the potential to damage surrounding structures, services, buildings or property, arrange an inspection with the owners of such structures, services, buildings and property and representatives of local or controlling authorities, as appropriate, to determine the condition of buildings, structures, services, paved surfaces, roads, kerbs, channels and the like, that the works could affect,

and document their current condition in sufficient detail to enable disturbances or damage which might be caused by the works to be evaluated. The Contractor shall furnish the Employer with copies of all such documentation and shall be held responsible for any disturbance and damage to such structures, services, buildings and property arising from the performance of the contract as well as any costs involved in refuting or processing such claims.

PS4.11 Water, sanitation and electricity for construction purposes

PS4.11.1 Water

The Contractor shall make his own arrangements with the Employer to obtain a potable water metered standpipe connection for which at least 14 days

notice shall be given. The size of the connection provided will be as specified in the Water and Sanitation By-laws.

The Contractor may only draw water from fire hydrants through means of a legal, Employer owned, potable water metered standpipe. Failure to use such Employer owned potable water metered standpipes, or using illegal, non-Employer owned equipment for purposes of drawing water from fire hydrants, will result in the Contractor having to pay an account to the Employer, for an amount determined by the Employer

The potable water metered standpipe(s) must be made available to the Employer's water inspectors for purposes of reading and inspection, and failure to do so, will result in the immediate withdrawal of such potable water metered standpipe(s). The onus is on the Contractor to return such potable water metered standpipe(s) if they are found to be defective (not registering consumption). Failure to do so will result in an account being levied, payable to and determined by the Employer. Claims for delays caused where standpipe(s) are withdrawn and/or replaced will not be considered.

The current water tariffs applicable to the Contract are available from the Employer.

PS4.11.2 Sewer

The Contractor shall provide, maintain, move to positions as required and finally remove proper sanitary accommodation at each work front. Sanitary accommodation shall be properly screened and its use strictly enforced. The Contractor shall comply with the Employer's Sanitation General By-Laws Section 19(1) and 19(3).

The situation of sanitary accommodation prescribed in terms of the Sanitary General By-Laws shall be approved by the Employer's Agent as being convenient for the person for whose use it is intended. The sanitary accommodation provided must be adequately ventilated, properly disinfected and kept in a thoroughly clean condition at all times.

The Contractor shall bear all costs associated with the provision of sanitary accommodation. Compensation for these costs will be made under the relevant item in the Schedule of Rates

PS4.11.3 Power

The Contractor shall make arrangements with the relevant authority for the supply and distribution of power for purposes of this Contract, the cost of which shall be deemed to be included in the rates inserted in the Schedule of Rates.

Power used for carrying out of the works in accordance with these Specifications will not be subject to measurement or payment.

PS4.12 Survey control and setting out of the works

The Contractor is to confirm the levels and coordinates of all benchmarks prior to commencing with construction.

PS5 MANAGEMENT OF THE WORKS

PS5.1 Applicable SANS 1921 Standards

SANS 1921-1:2004: Construction and management requirements for works contracts Part 1: General Engineering and construction works shall be applicable to this Contract

PS5.2 Planning and Programming

PS5.2.1 Work plan

Seven days prior to commencing with any part of the Works, the Contractor shall submit to the Employer's Agent, for review and approval, a work plan detailing the procedure and schedule to be used to execute such works, detailing and substantiating any deviation from the originally proposed approach. Further, the work plan shall include a:

a) time frame;
b) description of all equipment and tools to be used;
c) list of personnel and their qualifications and experience (including back-up personnel in the event that an individual is unavailable);
d) list of sub-contractors, schedule of work activity;
e) safety plan (clearly highlighting any potentially hazardous substances to be used);
f) traffic control plan (if applicable);
g) an environmental protection plan; and
h) Contingency plans for possible problems.

The approval given by the Employer's Agent shall in no way relieve the Contractor of the ultimate responsibility for the satisfactory completion of the work as prescribed under this Contract

Work plan shall be comprehensive, realistic and based on actual working conditions. Further it shall form the various sub-sections of the overall Contract programme and plan

NOTA BENE: No works shall be allowed to commence without an approved work plan.

PS5.2.2 Planning

The Contractor shall ensure that he:

a) is well informed with regard to the Employer's overall maintenance programme and avail resources as required to efficiently complete this Contract; and
b) delivers goods and services timeously to meet the Employer's prevalent performance standards and where applicable to not unnecessarily delay any other contractors, service providers and suppliers.

PS5.2.3 Programming

In order to ensure a clear understanding, at the inception of the Contract, of the programming and documentation format requirements, the Contractor shall appoint a project programmer/ planner for liaison during the Contract. The Contractor shall for the Contract Period provide and regularly update (maximum monthly) a Contract Programme.
The programme shall at minimum contain:

a) Time Scale (minimum):
   i) Days, where the period does not exceed three months. Weeks, where the project period exceeds three months.
   ii) Months, where the period does not exceed one year.
   iii) Years, where the project period exceeds one year.

b) Tasks: Where phases or stages are anticipated, this shall be the highest level of division, and all tasks related to the successful accomplishment of that phase of the area shall be grouped. Resources allocation and task dependency shall be indicated.
c) Start and Finish Dates: All tasks shall have specific start and finish dates.
d) Critical Path: All tasks forming the programme line that will establish any delays in the overall Contract Period shall be clearly indicated and an indication of their sensitivity characteristics shall be provided.
e) Progress Tracking: The Contractor shall be required to periodically indicate progress per task graphically and on a percentage basis.
f) Non-working Time: All South African public holidays, weekends and the local traditional annual builder's break shall be incorporated in the programme.
   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 show clearly the anticipated quantities of work to be performed each month, together with the manner in which the listed plant is to be used, as well as the anticipated earnings for the various sections of work.

***NOTA BENE*: A Contract programme shall be submitted to the Employer's Agent no later than 21 days after Contract Commencement Date.**

The Contractor shall provide the Employer's Agent with a method statement indicating the manner and sequence in which he intends to construct the works, for each work area, with the program. In the method statement the Contractor must address at least the following items:

a) sequence of the works for the relevant works area;
b) target dates for the tasks identified in sequence of the works for the relevant works area;
c) materials requirements;
d) construction Plant to be used;
e) services affecting construction; and
f) any factors that could affect construction progress after commencement.

The method statement must be approved by the Employer's Agent before commencement of construction. In order to minimize the impact on traffic, pedestrians and business the Contractor will be required to segment the works in such a manner that no portion of the works is more than one day ahead of the following position. These segments of the works shall be clearly defined in the Contractor's method statement for each work area.

If, during the progress of the work, the quantities of work performed per month fall below those shown on the program or if the sequence of operations is altered, or if the program is deviated from in any other way, the Contractor shall, within one week after being notified by the Employer's Agent, submit a revised program.

If the program is to be revised by reason of the Contractor falling behind his program, he shall produce a revised program showing the modifications to the original program necessary to ensure completion of the Works or any part thereof within the time for completion. Any proposal to increase the rate of work must be accompanied by positive steps to increase production by providing more labour and plant on the Site, or by using the available labour and plant in a more efficient manner.
Failure on the part of the Contractor to submit or to work according to the program or revised program shall be sufficient reason for the Employer to take steps as provided for in the General Conditions of Contract 2015.

The approval by the Employer's Agent of any program shall have no contractual significance other than that the Employer's Agent would be satisfied if the work is carried out in accordance with such program and that the Contractor undertakes to carry out the work in accordance with the program. It shall not limit the right of the Employer's Agent to instruct the Contractor to vary the program should circumstances make this necessary.

PS5.3 Sequence of the works

The sequence of works to be executed shall be agreed between the Employer's Agent and the Contractor. It is envisaged that the visual stormwater drainage surveys shall be executed, and its findings shall determine the order of the other works. Also see 'Prioritising works' in the Contract Data section.

Notwithstanding any changes that the Employer's Agent deems necessary the sequences should include the following:

A

- Contract Hand Over
- Public Participation Meeting
- Site Camp Establishment
- Appointment of CLO
- Instruction to Commence with Works
- Local labour Recruitment and Inductions
- Exposing of Existing Services
- Notification to Depot to confirm Existing Services and Tie-ins
- Procurement of Material
- SMME's Scope Identification
- Advertising and Appointment of SMME's

B

Team 1 (Main Contractor)

- Survey
- CCTV
- Excavation (Indicate Per Street)

- Pipe Laying (Indicate Per Street)
- Backfilling (Per Street)
- Manhole Construction
- Erf-Connections
- Practical Completion Date
- Completion Date

PS5.4 Software application for programming

The construction programme shall be completed in Microsoft ® Project Standard 2007 or compatible software. The construction programme and updated versions thereof shall be made electronically available to the Employer's Agent.

PS5.5 Methods and procedures

The Contractor shall submit to the Employer's Agent, within a period stated in the Contract Data, a detailed construction programme, detailing the date of commencement and completion of the work activities, dates, duration and extent of traffic accommodation interruption water supply to affected consumers. The detailed programme shall be based on the preliminary programme submitted with the tender and shall make an allowance for the following:

- Normal working hours shall be defined as between 07:00 and 17:00 Mondays to Fridays.
- No work outside working hours will be allowed. Should the Contractor wish to work outside normal working hours written permission shall be obtained from the Employer's Agent and all additional costs arising out of such work shall be entirely to the Contractor's account.
- Only one side of the street may be affected by the construction at any one time.
- The Employer's Agent may require that the construction of certain road crossings be done outside normal working hours.

The Employer's Agent shall provide the Contractor with drawings and details of the Works that need to be done.
Once a detailed programme has been approved, the Contractor shall not deviate from the planned operations.

PS5.6 Quality plans and control

The onus to produce work that conforms in quality and accuracy of detail to the requirements of the specifications and drawings rests with the Contractor, and the Contractor shall, at his own expense adhere to the quality monitoring system set by Employer's Agent and where not available, The contractor will institute their quality monitoring system as long as it conforms with the required SANS standard. The contractor must provide the experienced personnel, together with all transport, instruments and equipment to ensure adequate supervision and positive control of the works at all times.

The cost of supervision and process control will be deemed to be included in the rates tendered for the related items of work.

On completion and submission of every part of the Works to the Employer's Agent for examination, the Contractor shall furnish the Employer's Agent with proof of quality in the form of a data pack containing measurements, inspection request, daily diaries, levels and all compaction, air or water test results and CCTV results in the form of a DVD to indicate compliance with the scope of work.

PS5.7 Accommodation of traffic on public roads occupied by the Contractor

PS5.7.1 Accommodation of traffic

The Contractor shall ensure the safe accommodation of traffic at all areas where the work may impact traffic and shall provide all delineators, watching, lighting, signs and barricades required by the road authorities, and in accordance with the South African Road Traffic Signs Manual.

PS5.7.2 Access to properties

Adequate access shall at all times be maintained to public and private properties unless otherwise arranged and approved. Details of the proposed means of access shall be submitted before any such access is restricted. Claims arising from impeded access shall be the responsibility of the Contractor.
At least 7 days before commencing any work affecting access to a property, the Employer's Agent and the occupier/owner of each such property shall be notified of the Contractor's intention to commence work, the date of commencement, expected duration and arrangements which will be made regarding maintenance of access.

PS5.7.3 Transport Department requirements

The Contractor shall provide a structurally sound and safe bridge with side rails across dangerous excavations crossing sidewalks to allow pedestrians safe access to such sidewalk. Associated costs for the provision of pedestrian access to sidewalks shall be deemed to have been included under the various excavations or combined activity rates and/or prices in the pricing schedules.

PS5.8 Other Contractors on site

There may be other Contractors working within the same area. As such, the Contractor is required to make adequate allowances for such possibilities. No claims with respect to works being carried out by other contractors shall be entertained by the Employer.

PS5.9 Testing, completion, commissioning and correction of defects

The onus is on the Contractor to produce goods and services which shall conform in quality and in accuracy of detail to the requirements hereinafter specified. The Contractor must clearly understand that it is not the duty of the Employer's Agent or his representative to act as foreman or surveyor on the Works.

The Contractor shall, at his own expense, provide experienced Employer's Agents, foremen and surveyors together with all transport, instruments and equipment for supervising, checking and controlling the work.

The act of passing any completed work or accepting materials or goods for payment by the Employer's Agent shall not be construed as signifying approval or acceptance thereof. Failure on the part of the Employer's Agent to reject any defective work or material or goods shall not in any way relieve the Contractor of his obligations under the Contract, nor prevent later rejection when such work or material is discovered.

The Contractor shall, when submitting any work to the Employer's Agent for examination, satisfy himself by testing, measurement and otherwise as may be necessary that the work does in fact meet with the requirements of the Specifications. This information shall be submitted with the Contractor's request for examination and the Employer's Agent shall be authorised to decide on the number and type of tests, measurements, etc. required to enable him to judge the quality of the work. The submission of this information shall in no way diminish the authority of the Employer's Agent to conduct such tests as he may consider necessary in order to determine the quality of the work performed by the Contractor, nor shall he be bound to take account of the Contractor's tests, measurements, etc. should he consider these to be either incorrect or not representative.

Quality control and completion tests shall be in accordance with the relevant standard and amended specifications and additional specifications.

PS5.10 Recording of Weather and Abnormal Rainfall

If during the time for completion of the works or any extension thereof abnormal rainfall or wet conditions shall occur, then an extension of time in accordance with Clause 5.12.2 of the General Conditions of Contract 2015 hereof shall be granted by the Employer calculated in accordance with the formula given below for each calendar month or part thereof.

$$V = (Nw - Nn) + ((Rw - Rn)/X)$$

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 Y mm or more has been recorded.
Nn Average number of days, as derived from existing rainfall records, on which a rainfall of Y mm or more has been recorded for the calendar month.
Rw Actual rainfall in mm recorded for the calendar month under consideration.
Rn Average rainfall in mm for the calendar month as derived from existing rainfall records.

For purposes of the contract Nn, Rn, X and Y shall have those values assigned to them in the Appendix and/or the Specification.

The total extension of time shall be the algebraic sum of all monthly totals for the period under consideration, but if the total is negative the time for completion shall not be reduced due to subnormal rainfall. Extensions of time for part of a month to be calculated using pro rata values of Nn and Rn.

This formula does not take account of flood damage that could cause further or concurrent delays and will be treated separately as far as extension of time is concerned.

The factor (Nw-Nn) shall be considered to represent a fair allowance for variations from the average number of days during which rainfall exceeds Y mm. The factor (Rw-Rn)/X shall be considered to represent a fair allowance for variations from the average in the number of days during which the rainfall did not exceed Y mm but wet conditions prevented or disrupted work.

The following average rainfall figures are applicable:

INFORMATION SOURCE: South African Weather Service
Pretoria, Tel.: 082 233 8484

Y = 10 mm/24 hour day
X = 20 mm

Table 5.1: Statistical rainfall

STATISTICAL INFORMATION: JOHANNESBURG BOTANICAL GARDENS: 1985-2006		
Month	**RAINFALL**	
	Nn = Actual number of days during the calendar months in which a rainfall of more than Y-mm has been received	**Rn Average monthly rainfall**
January	4.1	116.4
February	3.6	121.3
March	2.6	96.0
April	1.1	30.4
May	0.5	15.2
June	0.1	5.9
July	0.0	1.5
August	0.2	8.7
September	0.3	13.2
October	2.0	66.0
November	3.0	84.5
December	3.8	105.4
TOTAL	**21.3**	**664.6**

The Contractor shall be permitted to take his own rainfall measurements on site subject to the Employer's Agent's approval, but access to the measuring gauge(s) shall be under the Employer's Agent's control. The Contractor is to provide and install all the necessary equipment for accurately measuring the rainfall as well as to provide, erect and maintain a security fence plus gate, padlock and keys at each measuring station, all at his own cost.

PS5.11 Format of communications

The Contractor and Client shall follow the communication protocol through the Employer's Agent and Contractor representatives. Communication media applicable shall be site meetings, telephone, fax, letter and email.

PS5.12 Key personnel

PS5.12.1 General

The key role players involved or associated with the contract are listed below with references made to the General Conditions of Contract:

- The Employer (GCC, Clause 1.1.1.15)
- The Employer's Agent (GCC, Clause 1.1.1.16)
- The Employer's Agent's Representative (GCC, Clause 1.1.1.17)
- The Contractor (GCC, Clause 1.1.1.9)
- The Contractor's Site Agent (GCC, Clause 4.12.2)
- Responsible person in terms of the OHAS Act (GCC, Clause 3.1.4)

The Contractor shall ensure that at least one sufficiently experienced pipe bursting supervisor is on-site full time while pipe bursting operations are performed.

Please note that the Contractor will be required to provide key personnel similar to or of higher qualifications and experience as stated in Contract Data Section.

PS5.13 Management meetings

Monthly site meetings shall be arranged and facilitated by the Employer's Agent or his representatives. Senior Contractor management staff attendance shall be compulsory.
The Contractor shall be required to provide reporting with regard to project progress, resources (human, plant and equipment), community issues, environmental and health and safety aspects.

PS5.14 Forms for contract administration

The Contractor shall maintain a file which shall contain project information related to project progress, resources (human, plant and equipment), community issues, environmental, health and safety aspects, quality control, penalties imposed, claims lodged and outcomes, disputes and resolutions, payment and variations.

PS5.15 Daily records

The Contractor shall keep daily site records as required by the Employer or his representative and as specified herein. Daily records shall include, labour, plant, materials, rainfall, environmental issues, health and safety issues, daily diary and the like. Such records shall is the property of the Employer and shall be made available to the Employer or his representative within 24 hours from being requested to do so.

PS5.16 Bonds and Guarantees

In addition to GCC 2015 Clause 8.6, the Contractor shall provide the Form of Guarantee for the due and punctual fulfilment and completion of all the Contractor's obligations under

the Contract. No extension of time of the Contract Period of Performance or neither any variation of the Contract, nor the determination of the Contract by the Employer in terms of Clause 8.6 hereof, shall in any way impair or diminish or terminate any liability to the Employer under and by virtue of such Guarantee.

Should the Contractor, when notified of the acceptance of his offer, fail to provide an approved Guarantee within the stated period, then the Employer may, at his sole discretion:

(a) Grant the Contractor a further reasonable period in which to provide the bond; or

(b) Withdraw his acceptance of the tender in which case the Contract shall be deemed to be void, but without prejudice to the Employer's rights to recover whatever damages he may have suffered by virtue of the Contractor's failure to fulfil his obligations.

PS5.17 Payment Certificates

Measurements will be done continuously between the Employer's Agents Representatives and the Contractor on dates and times agreed on. Dates must be arranged by these parties. The progress of the following items will be recorded hereunder:

- The Contractor will provide a certificate with quantities to the Employer's Agent before or on the 20th of every month.
- If any material on site is claimed, proof of ownership must be provided either by means of the necessary receipts or a letter from the supplier stating that ownership has been transferred to the Contractor upon delivery.
- After the payment certificate has been approved by Employer's Agent, the Contractor must issue a VAT invoice. The certificate will then be ready for processing.
- Payment certificates must be completed monthly and submitted to the Employer's Agent before or on the 20th of each month. The payment certificate shall be accompanied by the monthly EPWP stats, copies of individual contracts, certified copies of individual IDs, Timesheets and proof of payment.
- 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 Employer's Agent or his duly authorized representative.
- The Contractor will be required to submit his payment certificate together with monthly labour returns including copies of certified IDs, individual contracts, proof of payment and timesheets. **No payment certificate will be processed if correct labour returns are not submitted.**

PS6 FEATURES REQUIRING SPECIAL ATTENTION

PS6.1 Security

The Contractor shall be responsible to provide security on site(s):

a) as he deems necessary. The Employer shall not be held responsible for any loss or damage(s) suffered by the Contractor, his plant, equipment, materials, subcontractors or employees as a result of a security incident of any nature.

b) which have been identified, by the Employer's Agent and/or Employer, as potential high risk areas requiring security during site visits for the duration of the contract. The Contractor shall arrange that the security meet with the Employer's Agent and/or Employer representative at a convenient and safe location and thereafter escort to the necessary areas.

PS6.2 Operation of valves

Only employees of the Employer are permitted to operate primary and secondary water mains valves.

PS6.3 Work outside normal working hours

The Contractor is permitted to work outside of normal working hours only upon obtaining written permission from the Employer's Agent. It is anticipated that all switch-over work (tying new infrastructure into existing) will be completed during hours that will not affect the supply of water to affected communities.

PS6.4 Sanitary facilities

The Contractor is required to supply adequate sanitary facilities for employees, visitors, the Employer's Agent and Employer.

PS6.5 Community liaison and community relations

For the purpose of this project a community liaison officers will be required; who shall be required to inform the community with regards to Contractor's activities in particular where such activities may affect the service provision to the affected community (See PS6.6).

PS6.6 Notices and warning to consumers

The Contractor shall ensure he maintains service (water and/or sanitation) provision at all times whilst executing the works where:

a) The maximum amount of time of no service shall be 8 hours for any property. Any service disruption longer than 8 hours shall be temporary bypassed by methodologies approved by the Employer's Agent or his duly authorized representative.

b) A Public Notification Program shall be implemented, requiring at minimum that the Contractor shall deliver written notices to each domestic and non-domestic customer affected by the works, 48 hours before commencement of the works, including providing:
   i) a summary of work to be completed;
   ii) the time and duration of service interruption; and
   iii) a local telephone number to contact the Contractor for inquiries or complaints. All complaints received shall be addressed and resolved within the standard Employer response times and a summary of such complaints and associated actions shall be presented to the Employer's Agent or his duly authorized representatives on a monthly basis.

PS6.7 Continuity of service supply to customers

The activities of the Contractor shall not unreasonably interfere with the service supply to customer and be executed outside the agreed and notice time frames.

Where the Contractor cannot reasonably re-establish services within times agreed and notice time frames he shall proceed to contact the affected customer and make alternative arrangements that shall be acceptable to the customer and the Employer's Agent.

The associated costs of any customer claim arising from a lack of service provision due to the Contractor's negligence or his disregard for the Employer's SOP or his disregard for the conditions of this Contract, whilst executing activities as per this Contract, shall be solely for the account. The Employer shall have the right to make equivalent monetary deductions from monies owed to the Contractor or from his Guarantee under this Contract and any other active contract(s) with the Employer.

PS6.8 Conditions and procedures for service agencies

The Contractor shall comply with the conditions and procedures of the various affected service agencies, as mandated in their associated wayleaves.

PS6.9 Reinstatement of asphalt by JRA

The JRA shall be given first preference to provide and execute all the reinstatement of asphalt at places where excavation is within the roadway. The Contractor shall make other adequate arrangements where the JRA:

a) indicated that it will not, for whatever reason, be able perform such asphalt resurfacing; and
b) is the cause of delays, where in particular the Contractor shall note that the Employer shall not be liable of any additional extension of time related cost obligations to the Contractor, as he shall be deemed have agreed adequate conditions with the JRA and allowed delays on the part of the Employer.

PS6.10 Generic labour-intensive specifications

EPWP guidelines shall be applicable to this Contract, and it is expected that the Contractor execute the majority portion of the works utilizing local labour. The Contractor will be required

to submit monthly labour returns, including individual contracts, certified ID copies, Timesheets and proof of payment.

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PS6.11 Causes for rejection

Causes for rejection shall include, but not be limited to, not complying to the Employer's requirements and/or specifications and the intended purpose for this Contract, thus:

a) poor data (including photographs, recording, prints and reports) and data management.
b) inaccurate surveys, with regard to linear meterage of manhole length.
c) poor quality of survey information.
d) silt, grease, and debris remaining in conduits after cleaning; and
e) poor quality construction and remedial works:
   i) Cracks in any concrete works or pre-cast units shall be cause for rejection.
   ii) honeycombed or patched areas in any concrete works or pre-cast units in excess of 0.02m^2 shall be cause for rejection.

PS6.12 Protection against water and storms

The Contractor shall be responsible for the full adequate protection of the works against damage due to storms, rain, floods, stormwater, subsoil water and seepage from whatever source. The Contractor shall take over the site where the works has to be executed at the beginning of the Contract Period and the full risk and cost of dealing with all water shall be borne by the Contractor.

The Contractor shall also provide all necessary pipe work, pumps and other appliances necessary for adequate dewatering of all excavations and shall maintain these in good condition and provide adequate standby equipment to ensure that no disruption of work will ensue as a result of possible breakdown of equipment.

PS6.13 Information supplied by the Employer's Agent

Certain information included in this document or supplied separately is presented in good faith and no guarantees can be given regarding the accuracy or representativeness thereof. This pertains more specifically to all soil tests, material results and similar information that are necessarily subject to limitations in the test methods and sampling. Natural variations in materials and formations also influence the applicability of certain conclusions.
The Employer can therefore not accept any responsibility for the accuracy of any information or for any damage resulting from the fact that the information later proved wrong or not representative. If the Contractor chooses to rely on the information he does so at his own risk.

PS6.14 Indemnity Certificate

The Contractor must, on completion of the Works, obtain certificates from all authorities concerned stating that they are satisfied with the condition of all borrow pits, detours, access roads and spoil material on their properties. The certificates must be handed over to the Employer's Agent before the maintenance period starts. The certificates will not exempt the Contractor from any obligations concerning the backfill of trenches, finishing off of borrow pits, access roads, detours etc. This work must still be carried out to the satisfaction of both the Employer and the Employer's Agent.

PS6.15 Political and Community unrest

The contractor shall notify the Client or its duly Authorized Representative/s of any unrest situation and shall indicate all active Contract sites affected.

PS7 HEALTH AND SAFETY FOR CONSTRUCTION WORK

a) The Occupational Health and Safety Specification of the Employer's is bound in Volume 3 of these contract documents. Volume 3 forms an integral part of the Contract Specification and, in particular, shall be a part of the HEALTH AND SAFETY SPECIFICATION FOR CONSTRUCTION WORK.

In terms of Construction Regulations 4 (1) (a) of the Occupational Health and Safety Act, Act No 85 of 1993, the Client is required to compile an occupational health and safety specification for any intended project and to provide the specification to prospective tenderers.

The objective of this specification is to ensure that the principal Contractor entering into a contract with the Client achieves and maintains an acceptable level of occupational health and safety performance.

The specification provides the requirements that the principal Contractor and other Contractors shall comply with in order to reduce the risks associated with the contract work, and that may lead to incidents causing injury and/or ill health, to a level as low as reasonably practicable and possible.

The Contractor, appointed by the Employer in terms of Regulation 4 (1) (c), is required to prepare an occupational health and safety plan.

This plan has to be prepared in terms of Regulation 5 (1) as well as the Client's occupational health and safety specification. In terms of Regulation 4 (2), the Client and the principle Contractor are required to agree on the occupational health and safety plan before any work may commence.

The principal Contractor's health and safety plan has to follow the framework in Volume 2, as a minimum.

PS 7.1 Site Specific Health and Safety Issues

b) The following site-specific assessment of health and safety issues includes a list of risk assessment headings that have been identified by the client as possibly applicable to the contract work for this project.

- Aggregate/Sand Delivery
- Arc welding
- Bench grinder
- Construction of manholes
- Compressed gas cylinders-handling
- Compressors – Air
- Cutting of pipes
- Distribution boards – Electrical
- Drivers – of vehicles
- Electrical installation – Maintenance of
- Excavator

- Gas explosions
- Fire prevention and protection
- Form and support work
- Front end loader
- Fuel supply
- Gas welding-cutting operations
- Hand and spray painting
- Hand tools
- Landscaping
- Laying of pipes
- Levelling – of materials
- Loading supervisor
- Loading/unloading - of trucks
- Machine operator
- Making of steel items
- Material delivery
- Material handling
- Mixer operator
- Pedestal drill
- Pedestal grinder
- Placing concrete
- Portable ladders
- Refuelling vehicles/plant
- Scaffolding
- Site establishment
- Trenches – Digging of
- Trees – Bracing/removing if roots are
- Damaged during excavations
- Use of angle grinder
- Use of portable electrical tools
- Work in confined spaces
- Work in elevated positions
- Working close to existing services i.e. electrical, wastewater etc
- Working close to water
- Workshops

PS 7.2 Barricading of Trenches

The Contractor shall ascertain himself of the nature, volume, stability, depth and possible safety risks of the excavations, before any decision with regards to the method of excavation is made.

Allowance for hand excavation has been made for the location of services. Extreme caution shall be taken when excavating along the route of the new pipe for existing services. Any damages and or repairs to the existing services will be for the Contractor's account.

The length of open excavation must at all times not exceed 100m

Adequately protected by a barrier or fence comprising fluorescent orange plastic netting of height at least 1 000mm and as close to the excavation as practicable; and

- Provided with notice boards marked “CLOSED” at each end of closed or partially closed roads,
- The barrier or fence (at least 1m high) shall be suitably wrapped with reflective red and white danger tape or provided with flashing orange lights, placed at 15m intervals along the barricading at night.
- Where the depth of an excavation or the nature of the material excavated renders the sides of the excavation liable to movement that might endanger the works or the workers engaged on the excavation,
- the sides of the excavation shall be supported by suitable timber or other sheeting adequately strutted and braced, all properly assembled and of sufficient strength and stiffness to prevent movement in the materials supported, or, alternatively,
- the slope of the excavated face or faces shall be reduced so that any danger to the works or workers is removed.

Any cavities formed by the fall of rock or earth due to rain, flooding, insufficient timbering or other causes, shall be adequately filled.

The Contractor shall so maintain borrow pits that they do not become a danger to persons or livestock.

Trenches may not be left open during the builder's holidays or for any shutdown period exceeding 5 calendar days. Should the Contractor not comply with this requirement without the written approval of the Employer’s Agent; the Employer’s Agent shall have the open trenches closed by others at the expense of the Contractor. Furthermore, all further opening-up of the backfilled excavation and dealing with the excavated material and subsequent making good will all be to the Contractor's cost.

PS 7.3 Precaution against Pollution and Contamination

The Contractor shall take all necessary steps and precautions to prevent pollution of the surrounding area by his employees in any way. Any debris falling from construction vehicles and plant shall be removed immediately.

Every care is to be taken to avoid possible contamination of the mains during construction. Pipes are not to be stacked in the streets or gutters. On completion of a section, all loose material and foreign bodies are to be removed. The open ends of the new pipeline are to be protected by watertight caps, to the satisfaction of the Employer’s Agent, to prevent the entrance of groundwater and foreign bodies until such time as these sections are connected to the live mains.

PS 7.4 Operations under Live Conditions

Prior to the execution of any operation under live conditions, the Contractor shall liaise with the relevant Depot Manager, at least 7 working days in advance, in this regard. At least one representative of the Depot shall be present during the execution of such operation. These operations will include disconnection and reconnection to the existing Sewer/ Storm water main and Water storage tank at the works.

PS8 ENVIRONMENTAL MANAGEMENT PLAN

Tendering Contractors are to adhere to the mitigation measures listed in the EMP (refer to Volume 3: Occupational Health and Safety Specification and Environmental Management Plan for Capital Investment Projects). 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).

PORTION 2: VARIATIONS AND ADDITIONS TO THE STANDARDISED SPECIFICATIONS

PSA GENERAL

PSA 2 INTERPRETATIONS

PSA 2.3 DEFINITIONS

a) General

ADD THE FOLLOWING DEFINITIONS:

"General conditions: The General Conditions of Contract specified for use with this Contract and the special conditions of Contract as applicable.

Specified: As specified in the standardized specifications, the Drawings or the Project Specifications. Specifications shall have the corresponding meaning."

c) Measurement and payment

REPLACE THE DEFINITIONS FOR "fixed charge", "time-related charge" *AND* "value-related charge" *WITH THE FOLLOWING*:

"Fixed charge: A charge that is not subject to adjustment on account of variation in the value of the Contract amount or the Contract Time of Completion.

Time-related charge: A charge, the amount of which varies in accordance with the Time for Completion of the work, adjusted in accordance with the provisions of the Contract.

Value-related charge: A charge, the amount of which varies pro rata with the final value of the measured work executed and valued in accordance with the provisions of the Contract."

PSA 3 MATERIALS

PSA 3.1 QUALITY

ADD THE FOLLOWING:

"All manufactured materials supplied shall be new materials unless the contrary is specified. All materials specified in accordance with SANS Specifications shall bear the SANS mark, whether so specified or not."

ADD THE FOLLOWING SUB-CLAUSE:

"PSA 3.3 ORDERING OF MATERIALS

The quantities set out in the Schedule of Quantities have been carefully determined from calculations based on data available at the time and should therefore be considered to be

approximate quantities only. Before ordering materials of any kind the Contractor shall check with the Employer's Agent whether or not the scope of the work for which the materials are required is likely to change substantially. No liability or responsibility whatsoever shall be attached to the Employer for materials ordered by the Contractor except when ordered in accordance with written confirmation issued by the Employer's Agent."

PSA 4 PLANT

PSA 4.1 SILENCING OF PLANT

REPLACE THE CONTENTS OF SUBCLAUSE 4.1 WITH THE FOLLOWING:

"The Contractor's attention is drawn to the applicable regulations pertaining to noise and hearing conservation, framed under the Occupational Health and Safety Act, 1993 (Act No 85 of 1993) as amended.

The Contractor shall at all times and at his own cost, be responsible for implementing all necessary steps to ensure full compliance with such regulations, including but not restricted to the provision and use of suitable and effective silencing devices for pneumatic tools and other plant which would otherwise cause a noise level in excess of that specified in the said regulations.

Where appropriate, the Contractor shall further, by means of temporary barriers, effectively isolate the source of such noise in order to comply with the said regulations."

PSA 5 CONSTRUCTION

PSA 5.1 SURVEY

PSA 5.1.2 Preservation and replacement of survey beacons and pegs subject to the Land Survey Act

*DELETE THE WORDS "*in the vicinity of boundaries*" IN THE SECOND SENTENCE OF SUBCLAUSE 5.1.2 AND REPLACE THE WORDS "*under the direction of*" IN THE SAME SENTENCE WITH* "in consultation and liaison with."

ADD THE FOLLOWING AFTER THE SECOND SENTENCE OF SUBCLAUSE 5.1.2:

"The Contractor and the Employer's Agent shall record on the said list, their concurrence or disagreement (as the case may be) regarding the completeness and accuracy of the details recorded therein."

REPLACE THE THIRD SENTENCE OF SUBCLAUSE 5.1.2 WITH THE FOLLOWING:

"At the completion of the Contract, the Contractor shall expose all pegs that were listed at the commencement of the construction as being in order and the Contractor shall arrange with a registered Land Surveyor for the checking of the positions of all such pegs and the replacement of those that the Land Surveyor's check reveals have become disturbed or damaged. The Contractor shall, as a precedent to the issue of the Certificate of Completion, provide to the Employer's Agent, a certificate from the registered Land Surveyor, certifying that all the pegs listed at the commencement of construction in accordance with the provisions of this clause, have been checked and that those found

to have been disturbed, damaged or destroyed have been replaced in their correct positions, all in accordance with the provisions of the said Act.

The costs of all checking, replacement and certification as aforesaid shall be entirely for the Contractor's account. This, with the provisions always that the Contractor shall not be held liable for the cost of replacement of pegs which:

(a) cannot reasonably be re-established in their original positions by reason of the finished dimensions of the permanent works, and

(b) the contractor can prove beyond reasonable doubt to the satisfaction of the Employer's Agent, were disturbed, damaged or destroyed by others beyond his control."

PSA 5.3 PROTECTION OF EXISTING STRUCTURES

*REPLACE "*Machinery and Occupational Safety Act, 1983 (Act No 6 of 1983)*" WITH "*Occupational Health and Safety Act, 1993 (Act No 85 of 1993), as amended,*" AND INSERT THE FOLLOWING AFTER* "(Act No. 27 of 1956)": "as amended."

PSA 5.4 PROTECTION OF OVERHEAD AND UNDERGROUND SERVICES

REPLACE THE HEADING AND THE CONTENTS OF SUBCLAUSE 5.4 WITH THE FOLLOWING:

PSA 5.4 LOCATION AND PROTECTION OF EXISTING SERVICES

PSA 5.4.1 <u>Location of existing services</u>

Before commencing with any work in an area, the Contractor shall ascertain the presence and actual position of all services which can reasonably be expected by an experienced and competent Contractor to be present on, under, over or within the Site.

Without in any way limiting his liability in terms of the Conditions of Contract in relation to damage to property and interference with services, the Contractor shall, in collaboration with the Employer's Agent, obtain the most up-to-date plans as are available, showing the positions of services existing in the area where he intends to work. Neither the Employer nor the Employer's Agent offers any warranty as to the accuracy or completeness of such plans and because services can often not be reliably located from plans, the Contractor shall ascertain the actual location of services depicted on such plans by means of careful inspection of the Site.

Thereafter, the Contractor shall, by the use of appropriate methodologies, carefully expose the services at such positions as are agreed to by the Employer's Agent, for the purposes of verifying the exact location and position of the services. Where the exposure of existing services involves excavation to expose underground services, the further requirements of Clauses 4.4 of GCC 2015 and 5.1.2.2 of SANS 1200 D (as amended) shall apply.

The aforesaid procedure shall also be followed in respect of services not shown on the plans but which may reasonably be anticipated by an experienced Contractor to be present or potentially present on the site.

All services, the positions of which have been determined as aforesaid at the critical points, shall henceforth be designated as 'known services' and their positions shall be indicated by the Contractor on a separate set of drawings, a copy of which shall be furnished to the Employer's Agent without delay.

As soon as any service which has not been identified and located as described above is encountered on, under, over or within the site, it shall henceforth be deemed to be a known service and the aforesaid provisions pertaining to locating, verifying and recording its position on the balance of the site shall apply. The Contractor shall notify the Employer's Agent immediately when any such service is encountered or discovered on the Site.

Whilst he is in possession of the Site, the Contractor shall be liable for all loss of or damage as may occur to

(a) known services, anywhere along the entire lengths of their routes, as may reasonably be deduced from the actual locations at which their positions were verified as aforesaid, due cognizance being taken of such deviations in line and level which may reasonably be anticipated, and

(b) any other service which ought reasonably to have been a known service in accordance with the provisions of this clause.

The Contractor shall also be liable for consequential damage in regard to (a) and (b), whether caused directly by the Contractor's operations or by the lack of proper protection.

No separate payment will be made to the Contractor in respect of any costs incurred in preparing and submitting to the Employer's Agent the Drawings as aforesaid. These costs shall be deemed included in the Contractor's other tendered rates and prices included in the Contract.

Payment to the Contractor in respect of exposing services at the positions agreed by the Employer's Agent and as described above will be made under the payment items (if any) as may be provided for in the respective sections of the specifications pertaining to the type of work involved.

PSA 5.4.2 Protection during construction

The Contractor shall take all reasonable precautions and arrange its operations in such a manner as to prevent damage occurring to all known services during the period which the Contractor has occupation and/or possession of the Site.

Services left exposed shall be suitably protected from damage and in such a manner as will eliminate any danger arising there from to the public and/or workmen, all in accordance with the requirements of the prevailing legislation and related regulations.

Unless otherwise instructed by the Employer's Agent, no services shall be left exposed after its exact position has been determined and all excavations carried out for the purpose of exposing underground services shall be promptly backfilled and compacted. In roadways, the requirements of Subclause 5.9 of SANS 1200 DB should be observed. In other areas compaction is to be to 90% modified AASHTO density.

PSA 5.4.3 Alterations and repairs to existing services

Unless the contrary is clearly specified in the Contract or ordered by the Employer's Agent, the Contractor shall not carry out alterations to existing services. When any such alterations become necessary, the Contractor shall promptly inform the Employer's Agent, who will either make arrangements for such work to be executed by the owner of the service or instruct the Contractor to make such arrangements himself.

Should damage occur to any existing services, the Contractor shall immediately inform the Employer's Agent, or when this is not possible, the relevant authority, and obtain instructions as to who should carry out repairs. In urgent cases, the Contractor shall take appropriate steps to minimize damage to and interruption of the service. No repairs of telecommunication cables or electric power lines and cables shall be attempted by the Contractor.

The following list of contact telephone numbers is provided for:

Service	Authority	Contact Details	Contact Number
Communication	Telkom	J Tshabalala	(011) 301-9052
Electricity	Eskom	K Bedessie	(011) 711-2290
Municipal Electricity	City Power	D Oliver	(011) 490-7195
Gas	Sasol	B van der Heuvel	(011) 617-8261
Bulk Water	Rand Water	I Davids	(011) 682-0911
Provincial Road	Gautrans	J Olivier	(012) 310-2200
Municipal Road	Johannesburg Roads Agency	J Montero	(011) 298-5000

PSA 6 TOLERANCES

ADD THE FOLLOWING SUBCLAUSE TO CLUASE 6:

PSA 6.4 USE OF TOLERANCES

No guarantee is given that the full specified tolerances will be available independently of each other, and the Contractor is cautioned that the liberal or full use of any one or more of the tolerances may deprive him of the full or any use of tolerances relating to other aspects of the work.

Except where the contrary is specified, or when clearly not applicable, all quantities for measurement and payment shall be determined from the 'authorised' dimensions. These are specified dimensions or those shown on the drawings or, if changed, as finally prescribed by the Employer's Agent, without any allowance for the specified tolerances. Except if otherwise specified all measurements for determining quantities for payment will be based on the 'authorised' dimensions.

If work is constructed in accordance with the 'authorised' dimensions plus or minus the tolerances allowed, the calculation of quantities will be based on the 'authorised' dimensions, regardless of the actual dimensions to which the work has been constructed.

When the work is not constructed in accordance with the 'authorised' dimensions plus or minus the tolerances allowed, the Employer's Agent may nevertheless, at his sole discretion, accept the work for payment. In such cases no payment shall be made for

quantities of work or material in excess of those calculated for the 'authorised' dimensions, and where the actual dimensions are less than the 'authorised' dimensions minus the tolerance allowed, quantities for payment shall be calculated based on the actual dimensions as constructed."

PSA 7 TESTING

PSA 7.2 APPROVED LABORATORIES

REPLACE THE CONTENTS OF SUBCLAUSE 7.2 WITH THE FOLLOWING:

"Unless otherwise specified in the relevant specification or elsewhere in the Project Specification, the following shall be deemed to be approved laboratories in which design work, or testing required in terms of a specification for the purposes of acceptance by the Employer's Agent of the quality of materials used and/or workmanship achieved, may be carried out:

(a) Any testing laboratory certified by the South African National Accreditation Systems (SANAS) in respect of the nature and type of testing to be undertaken for the purposes of the Contract;
(b) Any testing laboratory owned, managed or operated by the Employer or the Employer's Agent;
(c) Any testing laboratory established and operated on the Site by or on behalf of the Employer or the Employer's Agent;
(d) Any other laboratory that the Employer's Agent approves in his absolute discretion."

MEASUREMENT AND PAYMENT

PSA 8.1 MEASUREMENT

PSA 8.1.2 Preliminary and General Item or Section

PSA 8.1.2.1 Contents

REPLACE THE LAST SENTENCE OF SUBCLAUSE 8.1.2.1(b) WITH THE FOLLOWING:

"Separate items will be scheduled to cover the fixed, value-related and time-related components of the Contractor's preliminary and general costs."

PSA 8.2 PAYMENT

PSA 8.2.1 Fixed-charge and Value-related Items

REPLACE THE CONTENTS OF SUBCLAUSE 8.2.1 WITH THE FOLLOWING:

PSA 8.2.1.1 Fixed-charge Items

Payment of fixed charges in respect of item 8.3.1 will be made as follows:

(a) EIGHTY PER CENT (80%) of the sum tendered will be paid when the facilities have been provided and approved;

(b) The remaining TWENTY PER CENT (20%) will be paid when the works have been completed, the facilities have been removed and the site of the Contractor's establishment has been cleared and cleaned to the satisfaction of the Employer's Agent.

No adjustment will be made to the sum tendered in respect of item 8.3.1 should the value of the works finally executed or the time for completion vary in any way from that specified in the tender."

PSA 8.2.1.2 <u>Value-related Items</u>

Payment for the sum tendered under item 8.3.2 will be made in three separate installments as follows:

(a) The first installment, which is 40% of the sum, will be paid when the Contractor has fulfilled all his obligations to date under this specification, the General Conditions of Contract and the Special Conditions of Contract, and when the value of work certified for payment, excluding materials on site and payments for preliminary and general items, is equal to not less than 5% of the total value of the work listed in the Schedule of Quantities.

(b) The second installment, which is 40% of the sum, will be made when the amount certified for payment, including retention moneys but excluding this second installment, exceeds 50% of the tender sum.

(c) The final payment, which is 20% of the sum, will be made when the works have been certified as completed and the Contractor has fulfilled all his obligations to date under this Specification, the General Conditions of Contract and the Special Conditions of Contract.

Should the value of the measured work finally completed be more or less than the tender sum, the sum tendered under item 8.3.2 will be adjusted up or down in accordance with the provisions of Clause 6.11 of the Conditions of Contract 2015, and this adjustment will be applied to the third installment."

PSA 8.2.2 <u>Time-related Items</u>

REPLACE THE CONTENTS OF SUBCLAUSE 8.2.2 WITH THE FOLLOWING:

"Subject to the provisions of sub clauses 8.2.3 and 8.2.4, payment under item 8.4.1 (time-related item) will be made monthly in equal amounts, calculated by dividing the sum tendered for the item by the tendered contract period in months, provided always that the total of the monthly amounts so paid for the item is not out of proportion to the value of the progress of the Works as a whole."

PSA 8.3 SCHEDULED FIXED-CHARGE AND VALUE-RELATED CHARGE

ADD THE FOLLOWING NEW SUBCLAUSES TO CLAUSE 8.3

PSA 8.3.5 Additional Contractual Obligations

PSA 8.3.5.1 **Notice and warning to consumers ……..Unit : Sum**

The sum shall cover the full compensation and cost of supply and delivery of the notices and warnings to customers at least 3 days before a shutdown is to take place in each section of work.

PSA 8.3.5.2 OHS Act Obligations (Compilation of OHSAct file)……...Unit: Sum

The sum shall cover the full compensation and fixed costs for the compliance with the Occupational Health and Safety Act, Construction Regulations 2014 and all the requirements stipulated in the Employer's Health and Safety Specifications."

PSA 8.3.5.3 EMP Obligations ……..Unit: Sum

The sum shall cover the full compensation and all fixed costs for compliance with the requirements of The Employer's Environmental Management Plan.

PSA 8.4 SCHEDULED TIME-RELATED ITEMS

ADD THE FOLLOWING NEW SUBCLAUSES TO CLAUSE 8.4.

PSA 8.4.6 Additional Obligations

PSA 8.4.6.1 1) Compliance with Health and Safety Plan including Safety Officer Salary…Unit: Sum

The sum shall cover the full compensation and all time related costs for the duration of the contract, for the compliance with the Occupational Health and Safety Act, Construction Regulations 2014 and all the requirements stipulated in the Employer's Health and Safety Specifications. The cost shall include the salary for a full time OHS Officer for the project.

2) Environmental Officer Salary……..Unit: Month

The Contract shall appoint a suitably qualified Environmental Officer, for any Project that triggers Environmental Authorization and approved by Johannesburg Water SOC Ltd.

Appointment	Qualifications and Experience
Full time site Environmental Liaison Officer/Environmental Officer	• National Dip in Environmental Management/ + 3 years' experience in construction project; or • BA/BSc Environmental Management + 3 years' experience in construction project;

3) Environmental Control Officer……Unit: Sated Provisional Sum

The Engineer shall allow for a Provisional Sum for the Environmental Control Officer who shall be employed by the Project for any Environmental Authorized project.

Appointment	Qualifications and Experience
Environmental Control Officer(ECO)	• National Diploma or BA/BSc Environmental Management + 3 years' experience as an Independent ECO;

PSA 8.4.6.2 **Security services costs……..……..…...Unit: Month**

The sum shall cover the full compensation and all costs for a sufficient 24 hour guarded services for the duration of the contract.

PSA 8.4.6.3 **Community Liaison Officer ……..Unit: Stated Sum**

PSA 8.4.6.4 **Risk Assessments every month…….Unit: Month**

The stated sum shall cover full compensation and all costs payable on a monthly basis, to provide a full Risk Assessment on the project.

PSA 8.4.6.5 **Community Participation cost……..Unit: Prov Sum**

The stated sum shall cover all costs associated with the cost incurred by the Contractor during the Contract handover and Commencement of works.

PSA 8.5 SUMS STATED PROVISIONALLY BY EMPLOYER'S AGENT

AMEND SUBCLAUSE 8.5.b)1 AND ADD THE FOLLOWING ITEMS:

i) Alteration to existing services by authorities……Unit: Stated Sum
ii) Control tests by independent laboratory ……..….. Unit: Stated Sum
iii) Provision of photographic records ……Unit: Stated Sum
iv) CLO and CSO…….. Unit: Stated Sum
v) Temporary protection of services…….. Unit: Stated Sum
vi) Pipeline Cathodic Protection……. Unit: Stated Sum
vii) Reinstatement of asphalt by JRA……... Unit: Stated Sum
viii) Community Participation Cost……Unit: Prov Sum
ix) Etc……..

The Contractor is responsible for both the cost of normal testing as described in the Project Specifications and for the cost of any additional test that indicates that the Specifications have not been complied with."

These sums will be paid to the Contractor in equal monthly amounts."

PSA 8.7 DAYWORKS

ADD THE FOLLOWING NEW CLAUSES:

PSA 8.7.1 Scope

This section covers the method of measurement and payment for work carried out on a day work basis.

PSA 8.7.1.1 General Requirements

Work will be classified as day work only if the Employer's Agent considers no other rate in the Bill of Quantities appropriate for payment purposes.

An instruction regarding all work to be carried out under day work in terms of Clause 6.5 of the General Conditions of Contract 2015 will be issued at the discretion of the Employer's Agent. Some or all of the items priced under day work in the Bill of Quantities may possibly not be required for this Contract.

Before ordering any material, the Contractor shall submit quotations to the Employer's Agent for his approval, and shall submit such receipts or vouchers to the Employer's Agent as may be necessary for proving the amount claimed.

PSA 8.7.1.2 Measurement and Payment - Day works

The day work rates submitted for vehicles and construction equipment, in the Bill of Quantities shall be a hire charge for the use of the vehicle and driver or constructional plant/equipment and operator (excluding VAT) and shall apply only to vehicles and construction equipment approved in writing by the Employer's Agent. The rate shall include for maintenance, fuels and oils and other operating costs, establishment, insurance and other contingency costs relating to the running of the vehicle, plant or equipment.

Where there is ambiguity between the power developed at the flywheel and mass of a machine, the power shall govern the measurement category.

The Contractor and the Employer's Agent will agree on the method of recording the working hours prior to the commencement of the work. Any long period of idling at any one time which in the opinion of the Employer's Agent or his representative is beyond that required for normal operating conditions will not be paid for as working time. Non-working hours for any reason shall not be measured for payment.

The ten percent allowed for overheads etc. as per Clause 6.5.1.2.3 of the General Conditions of Contract 2015 shall include full compensation for all administrative costs, supervision, overheads, liabilities and obligations related to the running of the vehicles, constructional plant and equipment. The tendered percentage shall also include for profit and shall be subject to the Contract Price Adjustment factor laid down in the Contract Data.

PSA 8.8 TEMPORARY WORKS

PSA 8.8.4 Existing Services

AMEND THE SUB CLAUSE AS FOLLOWS:

PSA8.8.4 a) Supply or hire of specialist equipment ……Unit: ProvSum/Sum

The sum shall cover the cost for the supply, operation and/or hire of specialist equipment for detection of underground services as ordered by the Employer's Agent.

b) Excavate by hand in soft material to expose existing services……..Unit: m^3

The rate shall cover the cost for removal of premix or other surfacing where necessary, excavating in all materials, shoring, backfilling, compaction and reinstatement of surfaces except for asphalt.

PSA 8.9 STANDING TIME……..……Unit: hour

Rate to include all costs the Contractor incurs on an hourly basis for all resources. Standing time will be paid to the Contractor in a case where there are delays attributable from the Employer in providing information or instruction and where the Contractor have no work to be undertaken during that period. For all equipment standing time will be dayworks rate less 10%.

PSAB EMPLOYER'S AGENT'S OFFICE

PSAB 3 MATERIALS

PSAB 3.1 NAMEBOARDS

DELETE THE ENTIRE CLAUSE AND REPLACE WITH:

"The name board shall be of either tempered hardboard at least 12mm thick or steel sheeting so braced on the reverse side as to prevent warping or buckling and shall be mounted on two or more firmly planted poles as necessary. The quality of the paint shall conform to SANS Standard Specification CKS 193. The colour of the paint shall conform to SANS 1091-1975 colour F11, strong blue. The Employer's SOC Ltd logo shall be in colour. The height of the larger name board shall be 2400mm and the width 4800mm, whilst the height of the smaller name board shall be 800mm and the width 1600mm".

PSAB 3.2 OFFICE BUILDING(S)

Delete this sub-clause entirely and re-title the sub-clause "FACILITIES FOR THE EMPLOYER'S AGENT"

Add the following sub-clause.

PSAB 3.2.1 Office Building(s)

The Contractor shall provide, furnish and equip one or more offices (as scheduled) for the use of the Employer's Agent.

The Contractor shall provide, furnish and equip one or more offices (as scheduled) for the use of the Employer's Agent.

Each office shall be weatherproof The Contractor shall provide and furnish one office for the use of the Employer's Agent. Each office shall consist of one room with a floor area of at least 15 m^2 and a ceiling height of at least 2.5 m.

, shall be air conditioned, shall have a wooden boarded floor that is at least 150 mm above the ground, and shall be provided with a ceiling and a lining to the walls, or equivalent insulation, with an acceptable type of door with a secure lock, and two opening windows of glazed area at least 3 m^2. Each office shall be well ventilated and shall be so insulated as to provide comfortable working conditions.

Office building shall be painted with an approved paint after erection and the paintwork shall be maintained during the contract period.

Each door shall be provided with a lock and two keys.

The sitting of all offices shall be to the Employer's Agent's satisfaction and shall be decided upon in consultation with him/her and confirmed in writing before erection.

All accommodation shall include the provision of access roads where required, fresh clean portable water and sewerage, which will be considered as part and parcel of the accommodation provided and will not be paid for separately.

The site Office shall be fenced using diamond wire mesh right round with access gate.

All accommodation shall meet with the approval of the Employer's Agent.

The offices shall comply with the following requirements.

Dimensions Office	Boardroom	Employer's Agent's
Minimum floor area	28 m^2	15 m^2
Minimum window area	4.0 m^2	3.0 m^2
Minimum window area opening	2.4 m^2	1.5 m^2
Minimum clear height	2.5 m	2.5 m
Shaded parking for vehicles		2

Furniture and Equipment

Employer's Agent's shall be equipped with the following:

(i) Office desk with a surface area of at least 1.5m^2 with at least 3 drawers one of which can be locked.

(ii) Two office chairs.

(iii) a lockable upright steel cabinet with three shelves or a steel filing cabinet with four drawers

(iv) Refrigerator

(v) Printer

(vi) Sufficient racks and hangers for hanging contract drawings. The hangers shall be of the "Barhold" type, with one hanger to five drawings.

(vii) 1 x Double 80-watt fluorescent light fittings complete with ballast and tubes.

The Boardroom shall be equipped with the following:

(i) Conference table large enough to accommodate twelve people and have an area of at least 15m^2.

(ii) Fifteen office chairs

(iii) 2 x Double 80-watt fluorescent light fittings complete with ballast and tubes.

The Contractor shall also supply a toilet for the exclusive use of the Employer's Agent.

The Contractor must provide basic survey instruments: dumpy level, tripod stand and staff.

On completion of the Works, ownership of the buildings, furnishings and equipment shall revert to the Contractor who shall remove them from the Site.

PSAB 3.3 CARPORT

ADD THE FOLLOWING NEW CLAUSE:

The Contractor shall construct the number of carports specified in Portion A of the Project Specifications, for the sole use of the Employer's Agent and his staff. Each carport shall be constructed so that the vehicle parked under it is always protected against the direct rays of the sun. The carport area shall be at least 20 m² and the floor shall be covered with a layer of crushed stone to alleviate dusty and muddy conditions. The carport(s)

shall be positioned so as to provide easy and convenient access to the Employer's Agent's office."

PSAB 4 PLANT

PSAB 4.1 TELEPHONE

REPLACE SUBCLAUSE 4.1 OF SANS 1200 AB WITH THE FOLLOWING:

"The Contractor shall arrange for the provision of a suitable approved by the Employer's Agent cellular phone and airtime and data bundles per month for the Employer's Agent's Representative. The Contractor at the tendered rates under the relevant scheduled item shall recover the associated charges and telephone calls and data bundles associates with the contract.

PSAB 4.2 SURVEY EQUIPMENT

ADD THE FOLLOWING NEW CLAUSE:

The Contractor shall provide on site and make available for the exclusive use of the Employer's Agent and his staff, the survey equipment listed in Portion A of the Project Specifications.

All survey equipment provided by the Contractor shall be in good condition, properly calibrated and fit for the purpose.

In addition to survey equipment provided by the Contractor for the exclusive use of the Employer's Agent and his staff, the Contractor shall make available for use by the Employer's Agent, the further survey equipment listed in Portion 1 of the Project Specifications, at all times when such is reasonably required by the Employer's Agent and his staff for the purposes of the Contract."

PSAB 4.3 COMPUTER FACILITIES

ADD THE FOLLOWING NEW CLAUSE:

The Contractor shall, for the duration of the Contract, provide the computer equipment complete with printer, modem and telephone connection including 3G connection together with the software specified hereunder, for the exclusive use of the Employer's Agent and his staff:

a) 1 laptop

b) 1 printer

The laptop shall comply with the following minimum specifications:

The laptop shall comply with the following minimum specifications:

Lenovo thinkpd T540P Intel Core 17-4700MQ, 8GB, 1TB, DVD+-RW DL, 15.6FHD (1920X1080), NVIDIA 1GB, 3

WAR: 3 Year on-site Warranty upgrade

Mem: Lenovo 8GB DDR3L 1600 (PC3-1280D) 50 DIMM Memory

Dock: Thinkpad Pro Dock-65W-South Africa

Printers shall, unless otherwise approved by the Employer's Agent, be SamsungSCX-4600 Colour Laser Printer Series or equivalent compatible.

All computer hardware shall be provided complete with the requisite connecting cables and all interfacing devices and software necessary for its efficient operation as an integral system.

The following software shall be properly installed on the computer, and the original license agreements and disks shall be provided to the Employer's Agent for safekeeping:

- Microsoft Windows 7 / XP
- MS-Office 2010 / XP
- MS Projects 2010

All computer equipment provided shall be kept fully serviceable at all times by the Contractor. The Contractor shall have any defective equipment repaired or replaced at his own cost within 12 hours after notification by the Employer's Agent's staff.

The Contractor shall further provide at his own cost, all paper and black ink cartridges and other consumables reasonably required by the Employer's Agent."

PSAB 5 CONSTRUCTION

ADD THE FOLLOWING NEW SUBCLAUSES TO CLAUSE 5 OF SANS 1200 AB:

PSAB 5.6 SURVEY EQUIPMENT

All survey equipment provided by the Contractor shall be kept fully serviceable at all times by the Contractor. The Contractor shall have any defective equipment repaired or replaced at his own cost within 12 hours after notification by the Employer's Agent's staff.

Where required by the Employer's Agent, the Contractor shall, at his own cost, promptly arrange for the recalibration of survey equipment provided."

PSC SITE CLEARANCE

PSC 3 MATERIALS

PSC 3.1 DISPOSAL OF MATERIALS

ADD THE FOLLOWING:

"The Contractor shall obtain his own dumping sites for the disposal of material and all transport costs shall be included in the rates tendered for site clearance."

PSC 5 CONSTRUCTION

PSC 5.1 AREAS TO BE CLEARED AND GRUBBED

ADD THE FOLLOWING:

"Small diameter pipeline routes shall be cleared to a distance of 1,0m on both sides of the pipeline centre line and large diameter pipeline routes shall be cleared to a distance of 2,0m on both sides of the pipeline centre line. Route pegs or markers shall not be destroyed or damaged during clearing operations."

PSC 5.2 CUTTING OF TREES

PSC 5.2.3 Preservation of trees

PSC 5.2.3.2 Individual trees

REPLACE THE LAST SENTENCE WITH THE FOLLOWING:

"An amount of R 2000.00 will be deducted from moneys due to the Contractor as a penalty for every tree that is damaged or removed unnecessarily."

PSC 8 MEASUREMENT AND PAYMENT

PSC 8.2 PAYMENT

PSC 8.2.1 Clear and grub

REPLACE THE FIRST LINE WITH THE FOLLOWING:

"The area designated by the Employer's Agent to be cleared and grubbed will be measured in square metre to the nearest square metre or," otherwise specified.

PSC 8.2.5 Take down existing fences

REPLACE ITEM 8.2.5 WITH THE FOLLOWING:

PSC 8.2.5 Take down existing fences:

(a) Description of fence ……..……..... Unit: m or km

(b) Etc for other items

The unit of measurement shall be the metre or kilometer of fence taken down and removed from the site.

The rate shall cover the cost of taking down the complete fence (fence height up to 2m) as scheduled and removing all fence material from the site, filling of holes, leveling ground surfaces and cleaning the site as well as providing temporary fence during construction."

PSC 8.2.8 Demolish and remove structures/buildings and dismantle steelwork, etc.

REPLACE "Unit: sum" *WITH* "Unit: sum or number of m²".

REPLACE THE LAST SENTENCE WITH:

"The rate shall cover the cost of all such separate items as scheduled in the Schedule of Quantities."

ADD THE FOLLOWING ITEMS:

PSC 8.2.11a Temporary fencing or hoarding:

(a) Indicate temporary usage, description and type …… Unit: m

(b) Etc for other usage and types.

The unit of measurement shall be the linear metre of fence or hoarding supplied and erected, and in the case of temporary fencing for maintaining and removing on completion of the works or part of the works.

The tendered rate shall include full compensation for the cost of supplying and erecting the complete fence as specified or scheduled and in the case of temporary fencing for taking down the fences, removing from the site, filling of holes, leveling ground surfaces and cleaning the site.

Seventy per cent (70%) of the tendered rate shall be payable on completion and approval of the temporary fences, and the remaining thirty per cent (30%) on completion of the removal of the fences.

PSC 8.2.11b Removal of man-made surfaces

The rate shall cover all plant, labour, material, saw cutting (asphalt and concrete), breaking up, lifting, loading, transportation, off-loading surfacing and storing (where applicable).

Unit: m²

Roadways, Asphalt and other layers

i) Asphalt (≤ 50mm thick) and including base, sub-base and subgrades layers up to 800mm deep.
ii) Asphalt (> 50 ≤ 100mm thick) and including base, sub-base and subgrades layers up to 800mm deep.
a)Footways and driveways
Asphalt ≤ 50mm thickness
Asphalt > 50 ≤ 100mm thickness
Interlocking concrete segmental paving blocks (all colours)
Concrete slabs (450 x 450mm)
Brick paving
Unreinforced concrete ≤75mm thick
Reinforced concrete ≤75mm thick
Grassing
Kerbing (all types of kerbing) …….... (Unit: m)

PSC 8.2.12 Backfilling and reinstatement of man-made surfaces

The rate shall cover the cost of all associated plant, labour, material, loading, transportation from storage, off-loading and placing (levelling and compacting where applicable) the following materials in roadways, footways and driveways in accordance with the COP:

PSC 8.2.12.1 Backfilling and reinstatement of roads

Unit:m²

a) Scenario A
i) 150mm base – G2 Graded crushed stone to 102% Mod AASHTO density
ii) 150mm subbase – G5 Graded crushed stone to 97% Mod AASHTO density
iii) 150mm Fill – G7 material compacted to 95% Mod AASHTO density
iv) 150mm selected subgrade – Insitu material compacted to 90% Mod AASHTO

b) Scenario B
i) 150mm base – G2 material compacted to 97% Mod AASHTO density
ii) 150mm subbase – C4 Stabilised gravel material to 95% Mod AASHTO density*

iii) 150mm selected subgrade - Insitu material compacted to 93% Mod AASHTO

***Rate shall include stabilization agent.**

c) Scenario C (Foot paths)

i) 150mm base – Recovered material compacted to 93% Mod AASHTO

ii) 150mm selected subgrade – Insitu material compacted to 90% Mod AASHTO

d) Surfacing

i) 30mm Bitumen hot –mix: Fine

ii) 70mm Bitumen hot –mix: BTB

PSC 8.2.12.2 <u>Backfilling and reinstatement footways</u>

a) Using removed materials:

i) Interlocking concrete segmental paving blocks (all colours) ……Unit: m^2

ii) Concrete slabs (450 x 450mm)……Unit:m^2

iii) Brick paving……..Unit:m^2

iv) Grassing……Unit:m^2

v) Kerbing……... (Unit:m)

b) Using new supplied materials:

i) 30mm Bitumen hot –mix: Fine

ii) Interlocking concrete segmental paving blocks, including a 20mm river sand bedding layer, jointing sand (plaster sand) and mortar infill between edge restraint and blocks
   1) Grey blocks
   2) Coloured blocks

iii) Concrete slabs (450 x 450mm) including a 20mm river sand bedding layer, jointing mortar.

iv) Brick paving including a 20mm river sand bedding layer, jointing sand (plaster sand) and mortar infill between edge restraint and bricks.

v) Unreinforced concrete ≤ 75mm thick (15MPa)

vi) Reinforced (395 mesh) concrete ≤ 75mm thick (15MPa)

vii) Grassing

viii) Concrete channeling, including formwork, leveling and compacting 300 x 125mm cast in situ concrete of 15MPa.

ix) Kerbing, including a 50mm bedding (cement and river sand), jointing mortar and 15MPa concrete haunching at all joints……..(Unit: m)
   1) Figure 1
   2) Figure 7
   3) Figure 8
   4) Figure 12

PSC 8.2.13 <u>Reinstatement of existing masonry walls and steel palisade fences</u>

The rate shall cover the cost of reinstating existing masonry walls, plastered or unplastered, and steel palisade fences (including any gates) including plant, labour, material, on-loading, transporting, off-loading and cleaning for the following:……..Unit: m^2

a) Face brick
   i) 110mm wall
   ii) 220mm wall
   iii) 330mm wall

b) Plastered
i)110mm wall
ii)220mm wall
iii)330mm wall
c) Steel palisade fences (height = 2.1m)

ADD THE FOLLOWING ITEMS:

PSC 8.2.14 <u>Protection of trees</u>

The rate shall cover the cost related to the protection of trees……..Unit: No

PSD EARTHWORKS

PSD 2 INTERPRETATIONS

PSD 2.1 SUPPORTING SPECIFICATIONS

REPLACE SUBCLAUSE 2.1.2 WITH THE FOLLOWING:

"PSD 2.1.2: Any of the other SANS 1200 Specifications may form part of the Contract Documents."

PSD 2.3 DEFINITIONS

REPLACE THE WORD AND THE DEFINITION FOR "Borrow" *WITH THE FOLLOWING:*

"Borrow material: Material, other than material obtained from excavations required for the Works, obtained from sources such as borrow pits or the authorised widening of excavations. "Borrow" shall have a corresponding meaning."

REPLACE THE DEFINITION FOR "Specified density" *WITH THE FOLLOWING:*

"Specified density: The specified dry density expressed as a percentage of modified AASHTO dry density."

REPLACE THE DEFINITION FOR "Stockpile" *WITH THE FOLLOWING:*

"Stockpile (verb): The process of selecting and, when necessary, loading, transporting and off-loading material in a designated area for later use for a specific purpose."

ADD THE FOLLOWING DEFINITIONS:

"Commercial source: A source of material provided by the Contractor, not the Employer, and including any borrow pit, provided by the Contractor.

Fill: An embankment or terrace constructed of material obtained from excavations or borrow pits. In roads it includes the earthworks up to the underside of the selected subgrade level.

Fill (material): Material used for the construction of an embankment or terrace.

Roadbed: The natural in situ material on which the fill, or in the absence of fill, the pavement layers, are constructed."

PSD 3 MATERIALS

PSD 3.1 CLASSIFICATION FOR EXCAVATION PURPOSES

PSD 3.1.1 Method of classifying

ADD THE FOLLOWING:

"The classification of material other than 'soft excavation' shall be agreed upon before excavation may commence.

The Contractor shall immediately inform the Employer's Agent if and when the nature of the material being excavated changes to such an extent that a new classification is warranted for further excavation. Failure on the part of the Contractor to advise the Employer's Agent in good time shall entitle the Employer's Agent to reclassify, at his discretion, such excavated material."

ADD THE FOLLOWING NEW SUB CLAUSES:

PSD 3.1.3 CLASSIFICATION FOR HAND EXCAVATION

Classification of material for various types of hand excavation will be based on the results of a dynamic cone penetrometer. The category of material shall be determined by testing the material at regular intervals and at various depths along the centre line of the trench. A minimum of 5 tests shall be done at each location and the average number of blows of the tests shall be used to determine the category of material.

The interval between test locations shall be determined by the variation of material type but shall not exceed 50m. The depth of testing shall be determined by the variation of material type and can increase or decrease in hardness with increasing depth of excavation. Table PSD 3.1.3 indicates the categories:

TABLE PSD 3.1.3: Classification for Hand Excavation

Category of Material	Consistency		DCP Blows to Penetrate 100mm	
	Granular	Cohesive	Granular	Cohesive
Soft Soft excavation shall be excavation in material that can be efficiently removed from the trench using a pick and shovel but not requiring prior breaking using mechanical equipment such as pavement breakers	Up to medium dense	Firm to stiff	0-6	1-5

Intermediate Intermediate excavation shall be excavation in material that require loosening with a hand spike (gwala) before being removed from the trench	Dense	Stiff to very stiff	7-15	6-8
Hard Hard excavation shall be excavation in material that requires prior breaking using mechanical equipment, such as pavement breakers with clay spades, before being removed from the trench.	Very dense		16-50	9-15
Rock Rock excavation shall be excavation in material other than described above which by nature of the material requires prior breaking using mechanical equipment, such as pavement breakers with moil points, before being removed from the trench	-	-	>50	>15

PSD 3.2.3 Material suitable for backfill or fill against structures

REPLACE THE CONTENTS OF THIS SUBCLAUSE WITH THE FOLLOWING:

"Material used for backfill behind structures shall generally be the material excavated, subject to the following conditions:

(a) The material shall not contain an excessive number of stones retained on a 50 mm sieve.

(b) The material shall not contain large clay lumps that do not break up under the action of the compaction equipment.

(c) The liquid limit of the material shall not exceed 40, neither shall the Pi exceed 18."

PSD 3.3 SELECTION

ADD THE FOLLOWING SUBCLAUSE:

PSD 3.3.3 Selection in borrow pits and excavations

Approval of a borrow area for a certain purpose does not necessarily mean that all the material in that area is suitable for the specified purpose. What it does mean is that the borrow area contains some suitable material. The onus shall rest on the Contractor to ensure that only material that is indeed suitable is removed and used for the specified purpose.

When the Contractor has to select excavated material for a specific purpose, the above provisions relating to borrow areas shall apply *mutatis mutandis* to excavations.

The Contractor shall not waste or contaminate material that has been selected for a specific purpose."

PSD 5 CONSTRUCTION

PSD 5.1 PRECAUTIONS

PSD 5.1.1 Safety

PSD 5.1.1.1 Barricading and lighting

REPLACE "Machinery and Occupational Safety Act, 1983 (Act 6 of 1983)" *WITH* "Occupational Health and Safety Act, 1993 (Act 85 of 1993)."

REPLACE SUB-PARAGRAPH (a) AND (b) WITH THE FOLLOWING AND ADD SUB-PARAGRAPH c):

a) adequately protected by a barrier or fence comprising fluorescent orange plastic netting of height at least 1 000mm and as close to the excavation as practicable; and

b) provided with notice boards marked "CLOSED – GESLUIT" at each end of closed or partially closed roads; and

c) provided with flashing orange lights, placed at 15m intervals along the barricading at night.

ADD THE FOLLOWING TO THIS SUBCLAUSE:

Should the Contractor fail to provide adequate lighting, signing and barricading, access to properties, or leave the site in a dangerous condition, the Employer's Agent shall be entitled to suspend all work under the Contractor until in the Employer's Agent's opinion

the Contractor's obligation in these respects have been fulfilled and/or arrange for any emergency work to be carried out by some other agency and to deduct the cost of this work from any monies due to the Contractor.

PSD 5.1.1.2 Safeguarding of excavations

REPLACE "Machinery and Occupational Safety Act" *IN SUB-PARAGRAPH* (a) *WITH* "Occupational Health and Safety Act, 1993 (Act 85 of 1993)."

ADD THE FOLLOWING TO SUB PARAGRAPH (d):

Loose ground, materials, tools and appliances shall be kept clear of the edge of the excavations and a pathway at least 0,30 m shall be left clear along the edge of the excavation.

PSD 5.1.1.3 Explosives

REPLACE THE CONTENTS OF THIS SUBCLAUSE AS FOLLOWS:

Where blasting is resorted to, it shall be carried out strictly according to Explosives Act and Regulations 1956 (Act No. 26 of 1956, as amended). However, in no case will blasting be allowed if a reasonable possibility exists of injury to any foundation, wall, pipe, cable or any structure, complete or partly complete. Where the Employer's Agent considers blasting to be dangerous, the same shall not be permitted and his decision shall be final and binding.

Wherever blasting is permitted and resorted to in the vicinity or within the limits of existing townships, roads, etc., it shall only be executed under the cover of sufficient earth backfill, heavy wire mesh screens or rubber matting of adequate weight and area to prevent the blasted material from being ejected from the trench. If any damage should occur, the Contractor shall carry out remedial work arising from such damage and will be held to have allowed therefore in his price.

The Contractor shall undertake such blasting so that the Peak Particle Velocity (PPV) as measured at the closest point to the existing outfall sewer and or building structure shall not exceed 25mm/s. Each blast shall be monitored and the findings recorded by an appropriately qualified explosives expert using a suitably calibrated apparatus. The Contractor shall also timeously inform the relevant inspectorate and obtain the required blasting permit from the South African Police Services, Division of Explosives before proceeding with any blasting on site. If in the opinion of the Employer's Agent, the Contractor makes careless use of explosives, he may forbid the Contractor the use of explosives.

It is a condition that should blasting result in the disturbing of material outside the trench, the Employer's Agent will require the Contractor to remove the disturbed material and backfill it to a compaction standard of the natural in-situ material. All this work for correcting areas of disturbed material will be done at the Contractor's cost.

The schedule rate for hard rock excavation shall cover all costs incurred in connection with supply, transportation, storage and handling of explosives, the related blasting costs and any remedial work should this be required.

PSD 5.1.1.4 Hard rock excavation without using explosives

ADD THE FOLLOWING TO THIS CLAUSE:

It is a condition that should blasting result in the disturbing of structures outside the trench; the Employer's Agent will require the Contractor to remove the rock material by means of pneumatic or hydraulic breakers, e.g. jack-hammers or wood-peckers.

The schedule rate for hard rock excavation without using explosives shall cover all costs incurred in connection with supply of specialist equipment, the transportation to and from the site as well as the removal and disposal of the hard material should this be required.

PSD 5.1.2 Existing services

PSD 5.1.2.2 Detection, location and exposure

REPLACE THE CONTENTS OF SUBCLAUSE 5.1.2.2 WITH THE FOLLOWING:

"The exposure by the Contractor of underground services, as required in terms of subclause 5.4 of SANS 1200 A (as amended) shall be carried out by careful hand excavation at such positions and to such dimensions as are agreed to by the Employer's Agent.

Unless otherwise instructed or agreed by the Employer's Agent, no service shall be left exposed after its exact position has been determined and all excavations carried out for the purposes of exposing underground services shall be promptly backfilled and compacted to the following densities:

(a) In roadways: 93% Mod AASHTO density; and

(b) In all other areas: 90% Mod AASHTO density.

Where hand excavations to expose underground services have to be carried out in roadways, the Contractor shall reinstate the road layerworks in accordance with the provisions of subclause 5.9 of SANS 1200 DB.

Payment in respect of exposing the services by means of hand excavation as described above, will be made in accordance with subclause PSA 8.8.4

Payment in respect of reinstating layerworks in roadways will be made in accordance with subclause 8.3.6.1 of SANS 1200 DB."

PSD 5.1.2.3 Protection of cables

REPLACE SUBCLAUSE 5.1.2.3 WITH THE FOLLOWING:

PSD 5.1.2.3 Protection during construction

Further to the requirements of subclause 5.4.2 of SANS 1200 A (as amended), major excavating equipment and other plant shall not be operated dangerously close to known services. Where necessary, excavation in close proximity to known services shall be carefully carried out with suitable hand tools, excluding picks wherever their use could damage the services. No additional payment will apply to such more difficult work.

Should any service not being a known service be discovered or encountered during the course of the Contract, the Contractor shall, in addition to complying with the requirements of subclause 5.4.2 of SANS 1200 A (as amended), immediately notify the Employer's Agent thereof and implement such measures as will prevent damage of such service or, if it was damaged in the course of discovery, will prevent and minimize the occurrence of any further damage occurring."

PSD 5.1.2.4 Negligence

PS8.1.1.1 *DELETE SUB-CLAUSE 5.1.2.4*

PSD 5.1.3 Stormwater and Groundwater

ADD THE FOLLOWING TO THE SUB-CLAUSE:

"The Contractor shall, where applicable and at the earliest practicable opportunity, install the permanent drainage specified or shown on the drawings and shall at his own cost provide the temporary drainage required to protect the Works."

PSD 5.1.4 Nuisance

PSD 5.1.4.3 Excavated material not to endanger or interfere

AMEND THE CLAUSE AS FOLLOWS:

"A safe, clear path shall be kept open at all times for pedestrians. Equipment, materials and waste shall be stored, stockpiled or removed in such a manner that pedestrians are not endangered and that the nuisance level is kept to a minimum. If construction activities occupy the whole footway and verge area so that pedestrians are forced to walk in the traffic lane, adequate protection from traffic shall be provided.

Where instructed by the Employer's Agent or where the Works impose a danger to traffic or pedestrians, the Contractor shall at his own cost remove off Site excavated material to temporary stockpiles (approved by the Employer's Agent) and the return to Site, excavated material for use as backfill or bedding."

ADD THE FOLLOWING NEW SUBCLAUSE:

PSD 5.1.4.4 Open Trenches

Unless otherwise permitted and where relevant, not more than the 100 m of trench in one place shall be opened ahead of the completed and backfilled pipeline."

PSD 5.1.5 Reinstatement and Maintenance of Roads

ADD THE FOLLOWING TO THE SUB-CLAUSE:

"Where crossings have been made, the roads shall be reinstated in accordance with the details specified in subclause 5.9 of SANS 1200 DB."

PSD 5.1.6 Road Traffic Control

DELETE THE SECOND SENTENCE OF SUBCLAUSE 5.1.6

PSD 5.2 METHODS AND PROCEDURES

PSD 5.2.2 Excavation

PSD 5.2.2.1 Excavation for general earthworks and for structures

ADD THE FOLLOWING TO PARAGRAPH (b):

"When the nature of the material precludes the above procedure, additional excavations shall be carried out to provide working space for the erection of formwork. The rate tendered for item 8.3.5 will be deemed to include the cost of a working width of 600 mm, but the Contractor may excavate a greater working width at no additional cost to the Employer."

REPLACE THE CONTENT OF PARAGRAPH (e) WITH THE FOLLOWING:

"Where excavations have been carried below the authorised levels, the Contractor shall backfill such excavations to the correct level with approved gravel compacted to 90% of modified AASHTO density or to the density of the surrounding material.

Where excavations have been carried out in hard material, the Employer's Agent may direct the over-excavation to be backfilled with weak concrete if there is a danger of settlement or differential settlement of the foundations.

Where the sides of excavations against which concrete is to be cast have been over-excavated or have collapsed partially, the Contractor shall retrim the excavations if necessary and, unless other remedial measures are agreed to by the Employer's Agent, shall cast the concrete for the structure, including the additional concrete that may be

required as a result of the over-excavation or partial collapse. The cost of the additional concrete or remedial measures shall be for the Contractor's account."

PSD 5.2.2.3 Disposal

REPLACE THE SECOND SENTENCE WITH THE FOLLOWING:

"The Contractor shall provide all necessary spoil sites for the spoiling of all surplus and unsuitable materials and shall make the necessary arrangements with the owner of the site where the material is disposed of, and pay all charges and levies as may be applicable for the use of such spoil sites.

Every spoil site provided by the Contractor shall be approved by the local authority in whose area it is located, and the spoiling shall comply with the applicable statutory and municipal regulations as well as the requirements of the owner of the spoil site.

Payment to the Contractor in respect of locating and making arrangements for suitable spoil sites and spoiling material at such sites will be made in accordance with the provisions of subclause PSD 8.3.14."

ADD THE FOLLOWING SUBCLAUSE IN SUBCLAUSE 5.2.2:

PSD 5.2.2.4 Selection and stockpiling

Approval or designation of the material in a particular borrow pit or excavation for a particular purpose does not imply that all the material in the borrow pit or excavation is suitable for the particular purpose to which the said approval or designation relates, nor that all material in the borrow pit or source should be used for the particular purpose. The Contractor shall select suitable material from that borrow pit or source, discard unsuitable material and reserve material for other purposes as necessary.

The Contractor shall organize and carry out his operations in such a manner as will prevent the contamination of suitable embankment and backfill material with unsuitable materials. Any excavated material which becomes, in the Employer's Agent's opinion, unsuitable for use in embankments or backfill as a result of contamination, shall be disposed of in a manner acceptable to the Employer's Agent and shall be replaced by the Contractor with materials acceptable to the Employer's Agent, all at the Contractor's cost."

PSD 5.2.5 Transport for earthworks

REPLACE THE CONTENT OF SUBCLAUSE WITH THE FOLLOWING:

"The transport of all excavated materials, irrespective of the distance and source, shall be deemed to be free-haul, the cost of which is included in the Contractor's tendered rates and prices for the excavation of the materials. No separate compensation shall apply for the transportation of excavated materials."

PSD 7 TESTING

PSD 7.2 TAKING AND TESTING OF SAMPLES

REPLACE THE CONTENT OF THIS SUBCLAUSE WITH THE FOLLOWING:

"The Contractor shall arrange with the approved independent laboratory by the Contractor to carry out sufficient tests on a regular basis as agreed between him and the Employer's Agent to determine whether the degree of compaction, and, where applicable, the quality of materials used, comply with the specifications and shall submit the results of these tests to the Employer's Agent in a form approved by him.

The compaction requirements for fills shall be deemed complied with when at least 75% of the dry-density tests on any lot show values equal to or above the specified density and when no single value is more than five percentage points below the specified value."

PSD 8 MEASUREMENT AND PAYMENT

PSD 8.3 SCHEDULED ITEMS

PSD 8.3.1 Site preparation

REPLACE SUBCLAUSES 8.3.1.1 AND 8.3.1.2 WITH THE FOLLOWING:

"Where site preparation such as clearing, grubbing, the removal of large trees or the removal and stockpiling of topsoil is required, the provisions and scheduled items of SANS 1200 C shall apply."

PSDB EARTHWORKS (PIPE TRENCHES)

PSDB 3 MATERIALS

PSDB 3.5 BACKFILL MATERIALS

ADD THE FOLLOWING PARAGRAPHS TO SUBCLAUSE:

"(c) Cement-stabilised backfilling

Backfilling shall, where directed by the Employer's Agent, be stabilized with 5% cement. The aggregate shall consist of approved soil or gravel containing stones not bigger than 38 mm and with a plasticity index not exceeding 10.

The soil or gravel shall be mixed with 5% cement and shall be compacted in layers of 100 mm thick to 90% of modified AASHTO density.

(d) Soil-crete backfilling

The aggregate for soil-crete shall be mixed with 5% cement and shall consist of approved soil or gravel containing stones not bigger than 38 mm and with a plasticity index not exceeding 10.

The soil or gravel shall be mixed in a concrete mixer with the cement and enough water to acquire a consistency that allows the mixture to be placed with vibrators to fill all voids between the pipe and the sides of the trench. Shuttering shall be used where necessary."

PSDB 3.7 SELECTION

REPLACE THE WORDS "If he so wishes" *IN THE FIRST LINE OF THE SECOND PARAGRAPH WITH THE WORDS* "at his own cost."

PSDB 5 CONSTRUCTION

PSDB 5.1 PRECAUTIONS

PSDB 5.1.2 Stormwater, Seepage and Dewatering of Excavation

PSDB 5.1.2.3 Sloping ground

ADD THE FOLLOWING SENTENCE AT THE END OF THE PARAGRAPH:

"All trench excavations on sloping embankments shall be backfilled in accordance with 5.6.2 over the full extent of the actual trench excavation and to the original embankment ground level."

PSDB 5.1.3 Accommodation of traffic and access to properties

REPLACE THE SEMICOLON AND THE WORD "and" *AT THE END OF THE SUBCLAUSE 5.1.3 (a) WITH A FULL STOP AND REPLACE ITEM (b) WITH THE FOLLOWING:*

"(b) Where necessary to achieve compliance by the Contractor with his obligations to provide and maintain pedestrian and vehicular access to properties affected by the works, the contractor shall construct and maintain to the satisfaction of the Employer's Agent, such temporary access roads around, and/or steel or timber bridges over excavations in roads, pavements, entrances or accesses to properties.

The Contractor shall make available on site at all times a sufficient number of steel plates at least 2.0m x 2.0m x 8mm thick to be laid across open trenches to provide access to private properties. The cost of providing, placing and removing the steel plates shall be included in the rates for trench excavation.

On completion of the work, the Contractor shall dismantle and remove all such temporary constructions and reinstate these areas to their former condition.

Except only where the Employer's Agent has included in the Schedule of Quantities, particular payment items specifically therefore, the Contractor will not be paid directly for the construction and maintenance of temporary access roads and/or the provision and maintenance of bridges as aforementioned, and the costs thereof shall be deemed included in the Contractor's tendered rates for excavation."

ADD THE FOLLOWING NEW SUBCLAUSE TO SUBCLAUSE 5.1:

PSDB 5.1.5 Removal of existing pipelines

Where existing pipes have to be removed, they shall be carefully opened up by machine excavation to 300 mm above the pipes after which the whole pipe shall be fully exposed by means of hand excavation. The excavation width shall comply with subclause 8.2.3.

The pipes shall be removed from the trench in a manner approved by the Employer's Agent, and brought to the surface for inspection by the Employer's Agent.

Pipes that are declared suitable for reuse and pipes declared unfit for reuse shall be dealt with in an applicable manner described in the specifications, or on the Drawings or on the Employer's Agent's instructions, as relevant."

PSDB 5.2 MINIMUM BASE WIDTHS

ADD THE FOLLOWING SUB PARAGRAPH TO:

c) Should the excavated trench width exceed the specified side allowance on each side of the pipe of 300mm by a value greater than 300mm, remedial measures shall be as directed and shall be provided at the Contractor's cost unless it can be shown that such excess width is due to factors beyond the Contractor's control.

Trench widths should be as near vertical as possible in order to minimize the quantity of selected fill material to be provided."

PSDB 5.4 EXCAVATION

ADD THE FOLLOWING SUB CLAUSES:

PSDB 5.4.1 Principles

"a) The cost of trimming excavations by hand or machine shall not be paid for separately but shall be included in the rates tendered for excavation.

b) All excavated material shall be kept within defined limits and shall, wherever possible, be deposited alongside the trench. The material shall be deposited so as to leave a clear strip of at least one metre between the edge of the trench and the excavated material and shall not cause undue inconvenience to traffic and property owners. The material shall be placed and kept well clear of all manhole covers, culvert in- and outlets, fire hydrants, benchmarks, stand pegs, fences, etc.

c) To prevent vertical trench walls from collapsing, excavated material shall, wherever possible, not be stacked on the side of any underlying strata sloping down towards the trench and in this regard attention is specifically drawn to the shales sloping south to north in the Pretoria area.

d) Excavations more than 1,5 m deep shall be adequately shored or braced to support the overhanging material and other loads which may occur. If the Contractor is of the opinion that shoring or bracing for an excavation of depth of more than 1,5 m is not necessary, he shall notify the Employer's Agent accordingly in writing, including a report from a Professional Engineer or a Professional Technologist competent in excavations. The report shall include the relevant laboratory tests.

e) The Contractor shall provide all the open and close timbering, strutting and shoring required for the safety of the excavations and structures adjacent to the trenches, and shall be solely and wholly responsible for ensuring the adequacy of these measures for this purpose.

Without in any way affecting or detracting from the Contractor's responsibility, the Employer's Agent shall have the right to instruct the Contractor to provide additional or improved timbering, shoring or strutting where he considers this to be necessary. The Contractor shall have no claim for additional payment on this account.

The shoring method adopted shall be compatible with the soil type and the excavating, backfilling and pipe-laying methods adopted and shall not place any undue restrictions on the laying of the pipes.

Timbering and shoring shall be left in position until the Employer's Agent has authorised their removal.

f) Shoring and bracing may not be necessary where the Contractor elects to slope the sides of the excavation to at least the maximum angle of repose measured relative to the horizontal plane, as determined by laboratory tests. Sloping of the sides could be combined with steps. The Contractor will submit the proposed excavation profile to the Employer's Agent for approval.

g) The cost for shoring, bracing and sloping of the sides will be included in the rates tendered for excavation. The cost for the services of a Professional Engineer or a Professional Technologist, including the relevant laboratory costs, shall be included in the tendered rates.

h) The Safety Officer, or another competent person appointed by the Contractor in writing, shall inspect every excavation, including bracing and shoring:

(i) daily, prior to each shift;

(ii) after every blasting operation;

(iii) after an unexpected fall of ground;

(iv) after substantial damage to supports; and

(v) after rain,

in order to pronounce the safety of the excavation to ensure the safety of persons, and those results are to be recorded in a register kept on site and made available to an inspector, the Employer, Employer's Agent, Contractor or employee upon request;

i) Each excavation which is accessible to the public or which is adjacent to public roads or thoroughfares, or whereby the safety of persons may be endangered, shall be

(i) adequately protected by a barrier or fence of at least one metre in height and as close to the excavation as is practicable; and

(ii) provided with warning illuminants or any other clearly visible boundary indicators at night or when visibility is poor."

PSDB 5.4.2 Hand Excavatability

PSDB 5.4.3 Excavation of Asphalt Surfaces

The existing asphalt road surfacing shall be saw-cut prior to excavation commencing for the full width of the trench as specified on the construction drawings so as to ensure a neat finish to the reinstated surfacing.

PSDB 5.6 BACKFILLING

PSDB 5.6.3 Disposal of Soft Excavation Material

DELETE THE EXISTING CLAUSE AND REPLACE WITH:

"The Contractor shall locate and negotiate for tipping sites for the disposal of surplus material and bear all costs in connection therewith. Arrangements for the consent of the owner of a property to deposit spoil and or temporary spoil thereon shall be confirmed in writing. Such arrangements shall be approved before being implemented. All spoil sites shall be neatly finished off and compacted to 90% of MOD.AASHTO density."

PSDB 5.6.6 Completion of Backfilling

ADD THE FOLLOWING:

Backfilling should not lag more than 50m behind the laying operation.

PSDB 5.7 COMPACTION

ADD THE FOLLOWING:

"Where pipelines cross existing gravel roads, backfilling shall be carried out as specified in Subclause 5.7.2 and payment therefore will be made under sub item 8.3.3.3."

■ PSDB 5.9 REINSTATEMENT OF SURFACES

ADD THE FOLLOWING TO THIS SUB CLAUSE:

PSDB 5.9.2 Private Property and Commonage

The ground and paved surface of servitudes, parks, driveways, roadways and sidewalks shall be reinstated to at least the standard and conditions as existed previously.

Grass sods shall be cut out from the grassed areas to be excavated and shall be set aside, preserved and kept damp until used for reinstatement. All other material to be used for reinstatement shall be suitably stored for such purpose.

The rate for reinstatement of block paved surfacing shall include all costs for the supplying and laying of the surfacing. The rate shall also cover for taking brick paving out carefully, stockpiling and replacement with new if bricks are broken or damaged. The rate must furthermore provide for all plant, labour and material costs associated with the work.

The rate for reinstatement of asphalt or concrete paved surfacing shall include all costs for the saw cutting, supplying and laying of the surfacing. The rate shall also cover for removal and spoiling of the material. The rate must furthermore provide for all plant, labour and material costs associated with the work.

The width of any trench through an area paved with bricks or precast concrete units shall be the minimum practicable width that, in the opinion of the Employer's Agent, can be removed without cutting bricks or precast units.

PSDB 5.9.4 Bitumen roads: Sub-base and Base

DELETE THIS SUB CLAUSE AND REPLACE WITH THE FOLLOWING:

Johannesburg Roads Agency will reinstate all asphalt surfaces. Refer to PS 6.7.

ADD THE FOLLOWING NEW SUB CLAUSES:

PSDB 5.9.7 Construction of Layers for Footways

The reinstatement of the paving blocks shall be the responsibility of the Contractor. The reinstatement and backfilling of pavement layers shall be done in accordance with PS 6.7

ADD THE FOLLOWING NEW SUB CLAUSES:

PSDB 5.9.8 Existing Kerbs and Channels

"Where excavations have to cross existing kerbs and channels, then:

a) In the case of a precast kerb and channel the kerb, segmented paving blocks and channel shall be carefully removed and stored so as to avoid any damage to or theft of the kerb and channel, and replaced after the excavation has been backfilled. Any damage to or theft of the kerb and channel shall be made good by the Contractor at his expense.

b) In the case of cast insitu or extruded insitu kerb and channel the kerb and channel shall be cut with a diamond tipped saw and carefully removed so as to avoid any damage to the remaining kerbs and channels. After the excavation has been backfilled the portion of kerb and channel removed shall be replaced with a cast insitu kerb and channel of the same profile as the existing kerb and channel."

ADD THE FOLLOWING NEW SUB-CLAUSE:

PSDB 5.11 LOCATION OF EXISTING SERVICES

Positions and details of known existing services as received from the various Departments are indicated on the Construction Drawings. Exact positions cannot be guaranteed by The Employer who will not be held responsible for any damages to any services. The Contractor shall excavate by hand to locate any such services and ensure that care is taken not to damage these services.

ADD THE FOLLOWING NEW SUB-CLAUSE:

PSDB 5.12 DEALING AND PROTECTING EXISTING SERVICES

All existing services, underground as well as above ground level, shall be protected by the Contractor in an appropriate manner, for the duration of the construction or as deemed necessary by the Employer's Agent, such that no damage to or interruption of the services shall occur.

ADD THE FOLLOWING NEW SUB-CLAUSE:

PSDB 5.13 GAS MAIN, ELECTRICITY AND TELECOMMUNICATION POLES

Gas mains, electricity and telecommunication poles along the pipe route are to be stabilized and protected prior to excavation and for the duration of construction.

ADD THE FOLLOWING NEW CLAUSE:

PSDB 5.14 TREES IN CONSTRUCTION PATH

Whenever possible any trees that lie within the construction path, shall not be removed and care shall be exercised to avoid damaging them. If the Contractor considers the removal of any tree unavoidable he/she shall obtain in writing the approval of the Employer's Agent and the Environmental Consultant prior to removal of any trees. Rates to cover removal and replacement where practical are provided in the schedule of quantities. A penalty of R2, 000.00 will be applied for any unauthorized or unnecessary damage to any tree which in the opinion of the Employer's Agent could have been avoided.

ADD THE FOLLOWING NEW SUBCLAUSE 5:

PSDB 7 TESTING

ADD THE FOLLOWING NEW SUBCLAUSE:

PSDB 7.2 Inspection at Intermediate Stages of Construction

The Contractor shall call the Employer's Agent, giving him reasonable notice, to inspect the works at the following intermediate stages of construction:

a) After completion of the trench excavation and preparation of the trench bottom and before any pipe is laid.

b) After the selected backfill material has been placed around the pipe and before the remainder of the trench is backfilled.

c) Before placing of premix on roads or any final surfacing on constructed footways. Work shall not progress through the specified stages without the approval of the Employer's Agent or his representative on site.

Failure to comply with the provision of this clause shall result in the suspension of the backfilling work until the testing has been approved by the Employer's Agent."

PSDB 8 MEASUREMENT AND PAYMENT

PSDB 8.1 BASIC PRINCIPLES

ADD THE FOLLOWING PRARGRAPH:

"The basic principle of measurement and payment for earthworks for a pipe trench is that the rates tendered for excavation shall also cover the cost of trimming, handling and shoring or bracing as specified in clause PSDB 5.4".

PSDB 8.3 SCHEDULED ITEMS

PSDB 8.3.2 Excavation

a) Excavate in all materials, for trenches, backfill compact and dispose of surplus material

ADD THE FOLLOWING SUB-ITEM:

The rate shall also cover the cost of excavating for trenches using labour intensive construction methods. The rate shall exclude the cost of removal of grass sods but shall include for the disposal of surplus/unsuitable material. The rate shall, in addition, cover the costs for compliance with the requirements of PSDB 5.4.1.

b) Extra over item (a) above for:

ADD THE FOLLOWING AT THE END OF THE EXISTING SUB-ITEM 2:

"No payments will be made under sub items (1) and (2) in respect of any materials measured and paid for under sub item 3 below."

AND ADD THE FOLLOWING NEW SUBITEMS IN 8.3.2(b):

"(3) Hand excavation and backfill where ordered by the Employer's Agent …Unit: m^3

The unit of measurement shall be the cubic metre of material, measured in place according to the authorized dimensions, which was excavated by the hand on the specific prior written instructions of the Employer's Agent; provided always that the Employer's Agent's said instruction shall have stated that measurement and payment for such hand excavation will be in accordance with this item.

The tendered rate shall include full compensation for the additional cost, effort and time resulting from excavating in the respective materials using hand methods only.

The Employer's Agent shall not be obliged to authorize payment under this item in respect of any hand excavation carried out (whether ordered in writing or otherwise), which hand excavation was in any case necessary to achieve compliance by the Contractor with his obligations under the Contract to

(i) utilize construction appropriate to the nature of the specific parts of the works; and/or

(ii) protect existing structures and/or services; and/or

(iii) comply with all prevailing legislation and regulations.

(4) Cutting of premix and concrete surfaces……Unit: m^2

The cutting of premix and concrete surfaces shall be measured per square metre of cut as scheduled. Cutting of premix and concrete surfaces shall be done with a diamond tipped saw or by some other approved method. The depth of the cut shall be such that the adjoining premix and concrete surfaces are not disturbed when excavation takes place. The cutting of surfaces shall be done 100mm on either side of the trench.

(5) Backfill stabilized with 5% cement where directed by the Employer's Agent….Unit: m^3

The unit of measurement shall be the cubic metre of backfill material, measured in place after compaction according to the authorised dimensions, which was stabilised on the Employer's Agent's instructions in accordance with subclause PSDB 3.5(c).

The tendered rate shall include full compensation for supplying the cement and for selecting, mixing, backfilling and compacting the stabilised material to 90% of modified AASHTO density.

(6) Soil-crete backfill where directed by the Employer's Agent …….Unit: m^3

The unit of measurement shall be the cubic metre of soil-crete placed on the Employer's Agent's instructions in accordance with subclause PSDB 3.5(d), measured in place according to the authorised dimensions.

The tendered rate shall include full compensation for supplying the cement and for selecting, mixing and placing the soilcrete as well as for the cost of shuttering if required."

PSDB 8.3.3 Excavation ancillaries

PSDB 8.3.3.3 Compaction in road reserves

REPLACE THE HEADING OF THIS SUBITEM WITH THE FOLLOWING:

"PSDB 8.3.3.3.3 Compaction in road crossings"

*REPLACE THE SENTENCE, "*The volume will be measured as specified in 8.2.2, 8.2.3 and 8.3.3.1"*, WITH THE FOLLOWING:*

"To determine the volume in the case of gravel roads, the depth will be measured from the underside of the gravel wearing course to the top of the fill blanket, and in the case of bitumen roads, from the underside of the subbase to the top of the fill blanket.

The rest of the trench shall be backfilled as specified in clauses 5.9.3, 5.9.4 and 5.9.5, as applicable, and payment will be made under item 8.3.6.1."

PSDB 8.3.3.4 Overhaul

REPLACE THE CONTENTS OF THIS ITEM WITH THE FOLLOWING:

"Measurement and payment shall be in accordance with subclause PSD 5.2.5."

PSDB 8.3.4 Particular items

PSDB 8.3.4(a) Shore trench opposite structure or service

REPLACE THE HEADING OF THIS SUBITEM WITH THE FOLLOWING:

PSDB 8.3.4(a) Shore trench opposite structure or service for depths:"

ADD THE FOLLOWING AFTER THE LAST SENTENCE:

"Separate items will be measured for depths of trenches in increments of 1 m. The rate for each stated category shall cover the cost of shoring from ground level up to the full depth of the stated category. Payment for this item will only be made if written instructions were issued by the Employer's Agent over and above the Standard Specifications for safety of excavations as specified in SANS 1200 DB, subclause 5.1."

PSDB 8.3.4(b) Temporary works: Control water inflow from …….. to ……..

REPLACE THIS SUBITEM WITH THE FOLLOWING:

PSDB 8.3.4(b) Accommodation of existing flows for temporary or permanent connections or construction of new structures or pipe trenches:

1) (Description of item stated) …… Unit: Sum

2) Etc for other structures

The tendered sums shall include full compensation for any inconvenience suffered, for normal and exceptional risks, for unforeseen eventualities and for maintaining the accommodated flow as long as necessary and shall include for the design and construction of all necessary temporary measures such as additional clearing, grubbing, earthworks, culverts, structures, pipework, pumping, cleaning up and any other associated work that may be required as specified in Clause PS1.5. Where a temporary structure for the accommodation of an existing flow has been designed by the Employer's Agent and is to be constructed by the Contractor, payment for such structure shall, unless otherwise stated in the scheduled item, be made under the applicable sub items in this payment item."

PSDB 8.3.5 Existing services that Intersect or Adjoin a Pipe Trench

PSDB 8.3.5 a) Services that intersect a trench

ADD TO THE FIRST SENTENCE OF THIS SUB CLAUSE AS FOLLOWS:

After "Except where water pipes are to be recovered" add "*and water leads for erf connections need to be renewed*"

ADD THD NEW SUBCLAUSE PSDB 8.3.5 c) TO CLAUSE 8.3.5 AS FOLLOWS:

PSDB 8.3.5 c) Services that require special care

1) Description of service……Unit: No

2) Etc for other items……Unit: No

The Unit of measurement shall be the number of each service described. Electricity, telecommunication poles and water mains along the pipe route are to be stabilised and protected prior to excavation and for the duration of construction. The rate shall cover the temporary stabilization and protection of electricity and telecommunication poles.

ADD THD NEW SUBCLAUSE PSDB 8.3.6.2 TO CLAUSE 8.3.6 AS FOLLOWS:

PSDB 8.3.6.2 Reinstatement of surfacing for footways

c) Brick paving ……..…….. Unit: m²

d) Concrete paving ……..…… Unit: m²

e) Concrete slabs …… Unit:. m²

The Unit of measurement shall be square metre of a reinstated. The rate for reinstatement of footway surfacing shall include all costs for careful removal, replacement of damaged sections and laying of the surfacing using labour intensive construction methods. The rates shall include for the lifting, stockpiling and replacement of broken or damaged bricks, blocks or slabs and shall provide for all plant, labour and material costs associated with the work.

The width of any trench through an area paved with bricks or precast concrete units shall be the minimum practicable width which, in the opinion of the Employer's Agent, can be removed without cutting bricks or precast units.

ADD THE NEW SUBCLAUSE PSDB 8.3.6.3 TO CLAUSE 8.3.6 AS FOLLOWS:

PSDB 8.3.6.3 **Reinstatement of kerbs and channels**……Unit: m²

The unit of measurement shall be square metre of area reinstated. The rate shall cover the cost of all labour, plant and material required and shall also include for the disposal of all unsuitable materials.

ADD THD NEW SUBCLAUSE PSDB 8.3.6.3 TO CLAUSE 8.3.6 AS FOLLOWS:

PSDB 8.3.6.4 **Reinstatement of grassed surfaces** ……Unit: m²

The unit of measurement shall be square metre of area reinstated. The rate shall cover the cost of careful removal of grass sods to a minimum depth to a minimum depth of 100mm, stockpiling, maintenance for later re-use and reinstatement thereof."

DELETE THIS SUBCLAUSE AND REPLACE WITH THE FOLLOWING:

PSDB 8.3.6.5 **Reinstatement of fence**

a) Description of fence……Unit: m

b) Etc for other items

The unit of measurement shall be the metre of fence reinstated complete. The rate shall cover the full compensation, labour, material and ancillary works for the reinstatement.

PSDK GABIONS AND PITCHING

PSDK 3 MATERIALS

PSDK 3.2 Pitching

PSDK 3.2.1 Stone

REPLACE THE CONTENTS OF TABLE 2 WITH THE FOLLOWING:

"TABLE 2 SIZE AND MASS OF INDIVIDUAL STONES FOR PITCHING

1	2	3	4
Size/mass of pitching	Thickness of pitching Mm, min	Least dimension Mm, min	Mass kg, min
Extra heavy	600	300	180
Heavy	400	190	50
Medium	300	150	27
Light	200	110	11

PSDK 5 CONSTRUCTION

PSDK 5.3.3 Grouted pitching

REPLACE THE WORDS "(Table 4)" *IN THE SECOND LINE OF THE FIRST PARAGRAPH WITH* "(Table 2)"

PSG CONCRETE STRUCTURAL

PSG 3 MATERIALS

PSG 3.2 CEMENT

PSG 3.2.2 Alternative types of cement

REPLACE THE CONTENTS OF THIS SUBCLAUSE WITH THE FOLLOWING:

"Only sulphate resistant cement shall be used on this project.

If the Contractor wishes to use any other type of cement, he shall obtain the Employer's Agent,s prior written approval (see 8.1 .3 .2 and 8.1.3.3.) The tendered rates, however, shall be based on the use of sulphate resistant cement only".

PSG 3.2.3 **Storage of cement**

ADD THE FOLLOWING:

"Cement shall not be store for longer than 12 weeks without the Employer's Agent's permission".

PS9 PSG 3.4 AGGREGATES

ADD THE FOLLOWING SUBCLUASE:

PSG 3.4.4 **Aggregate of dolomatic origin**

All aggregates for structural concrete, manholes, pipe encasement, pipe bedding cradles, mass filling, etc. shall be of dolomatic origin. The quantity of insoluble matter in respect of concrete made with aggregates of dolomatic origin, determined according to the method described in SANS 677, Appendix C, shall not be more than 15%.

PS10 PSG 4 PLANT

PSG 4.1 **GENERAL**

ADD THE FOLLOWING SUBCLAUSE

PSG 4.1.1 **Minimum Plant**

The contractor shall have the following minimum Plant available and in sound working order:

(a) Two concrete mixers, each of sufficient capacity to complete a section off the wall between horizontal construction joints within 4 hours and without interruption;

(b) Two concrete vibrators, at least one of which shall be powered by an internal combustion engine;

(c) One air compressor;

(d) Storage tanks at the water carts or trucks are adequate capacity to ensure that sufficient water will be available before commencement of every major concrete-placing operation.

If the Plant used for placing concrete for the structure of electrically or mechanically powered, the Contractors shall also provide some other approved, non- electrically powered standby means for placing concrete at an adequate rate in the event of a power or mechanical failure of the main Plant.

When the Contractor elects to place a crane inside the walls of the structure during the construction period, shall communicate with the Employer's Agent in good time to ensure that the design and layout of the panels that form the roof slabs and floor allow for such positioning of the crane. When sections of the roof and floor have to be redesigned to accommodate the crane, the redesigned cost shall be borne by the Contractor.

PS11 PSG 4.5 FORMWORK

PSG 4.5.1 Design

ADD THE FOLLOWING:

All form work with scaffolding required for any part the works shall be designed by the Contractor, and before commencing with the erection of any formwork or scaffolding, the Contractor shall submit the methods he proposes to use to the Employer's Agent for approval. The Employer's Agent has the authority to order alterations to the design or the sizes of any part of the formwork or scaffolding. The Contractor shall check the safety and suitability of all such alterations. The fact of the Employer's Agent has approved or altered any part of the formwork of scaffolding shall not be construed as relieving the Contractor of his responsibility with regard to the strength and stability of the formwork or scaffolding.

PSG 4.5.3 Ties

ADD THE FOLLOWING:

"No plugs, bolts, ties or clamps of any description used to hold formwork will be allowed into the project or through the concrete unless expressly approved by the Employer's Agent.

Only approved tie-rods consisting of solid rods (that remain embedded in the concrete) and with removable ends shall be used to hold the formwork of the walls. The removable tie-rod ends shall facilitate removal without damage to the concrete, and no permanently embedded parts of such tie-rods shall have less than 50mm of cover to the finished concrete surface.

The cavities left in the concrete when the tie-rod end cones are removed shall soundly caulked with a cement mortar to which an approved shrinkage-reducing agent has been added, and shall be neatly to finished to a smooth surface uniform with that of the surrounding concrete.

The cost of supplying special tie-rods as well as the filling of the cavities left by the tie-rod cones shall be included in the rates tendered for formwork under the appropriate pay items.

On no account shall formwork be secured to reinforcing bars".

PS12 PSG 5 CONSTRUCTION

PSG 5.1 REINFORCEMENT

PSG 5.1.2 Fixing

ADD THE FOLLOWING:

"The Employer's Agent will inspect the reinforcing after it has been fixed in place, the formwork has been cleaned, cover blocks have been positioned, and before concreting commences.

Welding of reinforcing steel will not be permitted".

PSG 5.1.3 Cover

ADD THE FOLLOWING:

"The distance between pipes in the reinforcing steel shall nowhere be less than:

(a) 40 mm or

(b) 5 mm plus the maximum size of the coarse aggregate, whichever is the largest

PS13 PSG 5.2 FORMWORK

PSG 5.2.5 Removal of formwork

ADD THE FOLLOWING SUBCLAUSE:

PSG 5.2.5.6 The Contractor shall make provision for the continued support of beams and slabs while the formwork is being removed and/or for that propping of beams and slabs".

PSG 5.3 HOLES, CHASES AND FIXING BLOCKS

ADD THE FOLLOWING:

"Cover blocks for reinforcing and fixtures may be placed into the concrete provided that neither the strength nor any other desirable characteristics (such as the appearance) of the concrete section is affected or impaired in the opinion of the Employer's Agent.

The holes or cavities left by the ferrule heads in the concrete of water-retaining structures shall be filled with an approved non-shrink grout applied strictly in accordance with the manufacturer's specifications."

PSG 5.4 PIPES AND CONDUITS

ADD THE FLLOWING:

"All pipes passing through to concrete floors, walls or slabs shall be cast into a concrete member simultaneously with the casting of the member. Openings for pipes shall only be left in concrete members when so directed by the Employer's Agent or when shown on the drawings. Pipes shall be installed in such openings according to the details shown on the drawings.

If water tightness is a requirement where pipes are cast into walls, floors and slabs, the Contractor shall ensure water tightness where smooth-surfaced pipes are used by using an approved method such as tape wrapping the pipes prior to casting in. The cost of such method will be deemed to be included in the rates tendered for item PSG 8.10".

PSG 5.5 CONCRETE

PSG 5.5.1 Quality

PSG 5.5.1.5 Durability

The exposure conditions of the concrete are classified as "severe".

PSG 5.5.1.7 Strength concrete

ADD THE FOLLOWING:

"The concrete mixes for sulphate resistant cement shall be designed by an approved laboratory for approval by the Employer's Agent before commencement of any concrete work".

PSG 5.5.3 **Mixing**

PSG 5.5.3.2 **Ready-mixed concrete**

ADD THE FOLLOWING:

"Ready-mixed concrete may be used on the Site. The contractor shall take samples for testing from every load delivered to the Site".

PSG 5.5 5 **Placing**

ADD THE FOLLOWING SUBCLAUSE:

PSG 5.5.5.10 "Concreting of the wall between horizontal construction joints shall be carried out in both directions from a point on the wall in order to close the gap with fresh concrete".

PSG 5.5.7 **Construction joints**

ADD THE FOLLOWING:

"Horizontal construction joints are permitted in structure walls in positions indicated on the drawings or approved by the Employer's Agent. Vertical construction joints in the wall are subject to the written approval of the Employer's Agent and the cost of all such vertical or horizontal construction joints will be deemed to be included in the rates for cast-in-situ concrete. This also applies to the preparation of concrete to form construction joints in the flume walls as specified on the drawings.

The construction joints in water-retaining structure shall be made strictly in accordance with the details shown on the drawings. The joints between screeds and concrete floors shall be regards as construction joints and the surface of the floor shall be prepared as described for construction joints.

Should the Contractor's method of construction necessitate the placing of construction or other joint in a position not shown on the drawings, such method of construction and position of the joint shall be approved by the Employer's Agent in writing. The cost of such joint shall be included in the tendered rates and shall include scrabbling of the concrete where steel reinforcement is continuous.

The walls shall be cast in lifts of height that permits each lift to be poured without interruption in one continuous operation during working hours.

It is the Contractor's responsibility to ensure that construction joints are watertight. The Contractor's proposed method for ensuring the watertightness of such joints shall be submitted to the Employer's Agent for his approval.

For construction joints at kickers all additional costs for concrete, preparation, etc will be deemed to be included in the rates tendered for concrete in walls or sides and kicker joints or construction joints will not be measured separately".

PSG 5.5.8 **Curing and protection**

ADD THE FOLLOWING:

"Curing by retaining the formwork in place or by covering with a waterproof membrane are the curing methods strongly recommended. Concrete will not be paid for unless properly cured and proof of curing is continuously visible on the Site".

PSG 5.5.11 **Watertight concrete**

ADD THE FOLLOWING:

"The minimum cement content in water-retaining structures shall be 325 kg/m³, and the maximum cement content shall be 450 kg/m³ in reinforced concrete."

The maximum water cement ratio for water-retaining structures shall be more 0, 50".

ADD THE FOLLOWING SUBCLAUSE:

PSG 5.5.16 **Soilcrete**

Where soilcrete is specified for filling under floor slabs the soilcrete shall comply with the requirements of subclause PSDB 3.5 (d) of section 1200 DP as amended and shall be placed as specified in this subclause.

PSG 6 **TOLERANCES**

PSG 6.2 **PERMISSIBLE DEVIATIONS**

PSG 6.2.3 **Specified permissible deviations**

ADD THE FOLLOWING:

"Degree of accuracy II is applicable

Every specified permissible deviation is binding in itself. The cumulative effect of permissible deviations will not be considered. The maximum permissible vertical deviation is subject to the other permissible deviations".

REPLACE SUBCLAUSE 6.2.3 (D)(5) WITH THE FOLLOWING:

	Permissible deviation		
	Degree of accuracy		
	III	II	I
	mm	mm	mm
"Vertically, per metre of height	5	3	2
Subject to a maximum	50	30	10

PSG 7 TESTS

PSG 7.1 FACILITIES & FREQUENCY OF SAMPLING

PSG 7.1.1. Facilities

ADD THE FOLLOWING:

"The Contractor shall provide sufficient storage capacity for the concrete cubes and shall arrange to have them tested by an approved laboratory.

The cost all testing, including the cost of sampling, storage and transporting samples should be included in the rates tendered for concrete work".

PS14 PSG 7.3 ACCEPTANCE CRITERIA FOR STRENGTH CONCRETE

ADD THE FOLLOWING:

"Test results obtained from the supplier of ready-mix concrete will not be accepted for evaluation in terms of subclause 7.3, but samples for testing shall be taken off such concrete at the point of placing ".

ADD THE FOLLOWING SUBCLAUSE:

PSG 7.3.6 Testing for watertightness

Water for testing shall be provided by the Contractor and shall be responsible for providing all necessary equipment that may be required for filling the structures.

The structure shall be filled with water at a uniform rate not exceeding 2.0 m in 24 hours until the top water level been reached. The water level will then be carefully noted and recorded by the Employer's Agent in relation to a fixed benchmark, and shall be contained by the addition of further water for a sterilising period to permit complete absorption of water by the concrete.

The sterilising period may be 7 days for a maximum design crack width of 0.1mm or 21 days for 0.2mm or larger. After the sterilising period, the level of the liquid surface shall be recorded at 24-hour intervals for a test period of 7 days. During the 7 day test period the total permissible drop in level, after allowing for evaporation shall not exceed 1/500 the one of the average water depth of the full tank, or 10 mm.

The evaporation shall be measured by the mean drop in level caused by the evaporation of the water in three flat containers floating in the water being recorded.

In the event of appreciable leakage being evident at any of the stages of the filling or testing or the event of the Employer's Agent considering the final degree of water tightness to be unsatisfactory, the contractor when ordered by the Employer's Agent shall discontinue such filling or testing and shall, at his own expense, take approved steps immediately to rectify the leakage, until a satisfactory test is obtained, which shall prove to the Employer's Agent that a sufficient degree of watertightness has been obtained.

The cost of emptying a water-retaining structure which cannot be drained shall be borne by the Contractor. The water shall be discharged in a manner approved by the Employer's Agent and shall be such that the employer can utilise the water is he so desires.

The water shall not be used as a medium for addictives to affect remedial work or to stop leaks.

The cost of retesting the structure for watertightness shall be borne by the Contractor".

PS15 PSG 8 MEASUREMENT AND PAYMENT

PSG 8.1 MEASUREMENT AND RATES

PSG 8.1.1 Formwork

DELEAT "or splays over 20 mm x 20 mm" FROM THE FIRST LINE OF PARAGRAPH 8.1.1.2

ADD THE FOLLOWING PARAGRAPH 8.1.1.2

"Splays up to and including 25 mm x 25 mm will not be measured separately and will be deemed to be included in the formwork costs".

ADD THE FOLLOWING PARAGRAPHS

"8.1.1.7 For construction joints at kickers (joint F), all additional costs for formwork to edges up to 300 mm high will be deemed to be included in the rates tendered for vertical formwork to sides of walls and will not be measured separately in narrow width.

8.1.1.8.1 No formwork will be measured to edges of blinding layers under structures and the cost thereof (if needed), will be deemed to be included in the rates tendered for concrete in blinding layers.

8.1.1.8.2 Back-shuttering or formwork to top revealed surfaces of sloping - or conical formwork will only be measured to surfaces over 40° and 85° to the horizontal.

8.1.1.8.3 Formwork to horizontal surfaces in pump stations, valve chambers, man holes or sumps can either be removed through the manhole cover opening or the Contractor may use permanent formwork at his own cost as no claims in this regard will be considered".

PSG 8.1.2 Reinforcement

REPLACE THE CONTENTS OF THIS SUBCLAUSE WITH THE FOLLOWING:

"The unit of measurement for steel bars shall be the ton of reinforcement in place, in accordance with the Drawings or as authorised by the Employer's Agent.

The unit of measurement for welded steel fabric shall be the kilogram of fabric reinforcement in place, and the quantity shall be calculated from the net area covered by mesh, excluding overlaps.

Clips, ties, separators, stools and other steel used for positioning reinforcement will not be measured, unless these are shown on the bending schedules.

The tendered rate shall include full compensation for the supply, delivery, cutting, bending, welding, placing and fixing of the steel reinforcement, including all tying wire, stools, supports and waste".

PSG 8.1.3 **Concrete**

Delete "or the plank size of the excavation where additional excavation is provided to facilitate erection of forms" from the second line of paragraph 8.1.3.1(c).

PSL **MEDIUM-PRESSURE PIPELINES**

PSL 2 **INTERPRETATIONS**

PSL 2.4 **ABREVIATIONS**

ADD THE FOLLOWING:

HDPE : High density polyethylene

mPVC : Modified Polyvinyl chloride

PSL 3 **MATERIALS**

PSL 3.1 **GENERAL**

ADD THE FOLLOWING TO CLAUSE:

The contract specifications for materials and construction activities will conform to SANS 1200, SANS 1914-5 and Johannesburg Water requirements. The project specifications will include specific items to ensure proper implementation, control reporting on labour based construction and methods as included in the specifications.

Materials for this contract should preferably be obtained from manufacturers who operate an effective quality management system such as that described in SANS 0157 or ISO 9000.

PSL 3.4 STEEL PIPES, FITTINGS, AND SPECIALS

PSL 3.4.3 Pipes of nominal bore over 150mm

OMIT PARAGRAPH (C) AND INSERT THE FOLLOWING:

"Steel pipes and fittings shall be manufactured in accordance with SANS 719 and SANS 1476 for a minimum Grade x 421 300WA dual certified (yield strength of 289MPa). The wall thickness of the pipes and fittings shall be 6 mm. All pipes and specials shall be supplied complete with couplings and jointing material.

Straight joints and bends to be fillet welded on site.

Pipes and fitting to be externally coated with fusion bonded medium density polyethylene (sintakote) or polyclad 777 and lined internally with solvent-free epoxy lining or similar approved. Thickness of lining shall not be less than 250 micron and test certificates of the lining thickness must be furnished to the Employer's Agent for his approval. E128 external corrosion protection at joints.

Cathodic protection design will be done by a specialist and will be procured separately and construction will be as directed by the specialist.

The pipe manufacturer shall submit to the Employer's Agent the steel maker's certificates covering all steel used. These certificates shall indicate the process of manufacture, the chemical analysis and the physical properties of the steel except that, at the option of the pipe manufacturer, the physical properties of the steel may be determined from specimens taken from finished pipe."

PSL 3.7 OTHER TYPES OF PIPES

PSL 3.7.1 <u>uPVC Pipes</u>

ADD THE FOLLOWING TO THE SUB CLAUSE

"uPVC Pipe's systems shall conform to SANS 966-1998Part1 or II as applicable and have integral pipe end sockets of the rubber ring joint type. All uPVC - pipes shall be in 6m lengths. Fittings and specials for uPVC pipes shall be manufactured in Grade 14 cast iron, rated to at least 1600kPa working pressure. Unless otherwise specified fittings and specials shall be bitumen dipped.

PSL 3.7.2 <u>Polyethylene Pipes</u>

REPLACE THE SUBCLASE WITH THE FOLLOWING

"HDPE pipes of diameter up to and including 63 mm shall conform with SANS 4427 Part 2 for Type IV pipes. HDPE pipes greater than 63 mm shall conform with SANS 4427 Part 3 for Type V pipes. Unless otherwise specified, pipes shall be Class 16 and plain ended for butt welding".

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 3.7.3 uPVC Pipes

Class 16 uPVC high impact pipes shall conform to SANS 1283 (alternatively ISO 4422) shall be used unless otherwise indicated. Jointing shall be effected by means of approved "press-on" shouldered ends and cast iron and steel victaulic clamps. Unless otherwise specified, pipes shall be Class 16.

Where the cutting of any pipe is necessary, shouldered ends shall be fixed to the pipe by means of an approved machine capable of clamping the pipe without causing any damage to the pipe and pressing on the shouldered end by means of a hydraulic operated jack applying a uniform axial force to locate the shouldered end truly in position. The use of impact force to either the pipe or shouldered end will not be permitted. No on-site fixing of shouldered ends shall be permitted. "

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 3.7.4 mPVC Pipes

High impact mPVC Class 16 and shall conform to SANS 1283 for diameter up to and including 315mm with a fully end load restraint coupling system approved by Johannesburg Water.

PSL 3.7.5 HDPE Pipes

HDPE pies and shall conform to SANS 4427 and shall be joined by Butt welding or electrofusion which will be done by full qualified welding personnel.

PSL 3.8 JOINTING MATERIAL

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 3.8.2 Flexible couplings

OMIT THE EXISTING CLAUSE AND INSERT THE FOLLOWING:

"All flexible couplings shall be "Viking Johnson" couplings without centre register, or approved similar.

Rubber rings shall be of the wedge-type and shall be manufactured from natural or synthetic rubber only. Reclaimed rubber shall not be used in the manufacture of the rubber rings."

PSL 3.8.3 Flanges and accessories

ADD THE FOLLOWING TO THE EXISTING CLAUSE:

"The dimensions and drilling of standard flanges shall comply with the requirements of SANS 1123 and SANS 1476 for a working pressure of 2500 kPa. Flanges shall be machined flat, i.e. without a raised joint face. Puddle flanges shall have the same dimensions as standard flanges but shall be undrilled. Flanges to be drilled according to Table 16.

Faces of flanges which will be in contact with jointing gaskets shall receive a protective coating of such thickness and consistence as will not impair the air/gas/water tightness of the joint."

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 3.8.8 Victaulic joints

Joints for uPVC and medium steel pipelines shall conform to SANS 815: Standard specifications for shouldered end pipes, fittings and couplings.

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 3.8.9 HDPE Pipe joints

Joints for HDPE pipe shall be by means of welding, welded flanges or approved external compression type fittings (Plasson or similar approved)."

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 3.8.10 HDPE Pipe Welding

Only SAPPMA or ISO approved welders shall be used for welding HDPE pipes.

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 3.9 CORROSION PROTECTION

PSL 3.9.2 Steel pipe

ADD THE FOLLOWING TO THE EXISTING CLAUSE:

"All coating and linings, shall be completed strictly to the publication "Corrosion Protection for Civil, Mechanical and Electrical Employer's Agent 2000 Edition.

Pipes and fitting shall be externally coated with fusion bonded medium density polyethylene (sintakote) or polyclad 777 and internally with liquid epoxy lining or similar approved.

The thickness of the lining material shall not be less than 250 micron and test certificates of the lining thickness must be furnished to the Employer's Agent for his approval."

PSL 3.9.2.3 Repairs to epoxy coatings

ADD THE FOLLOWING TO THE EXISTING CLAUSE:

PSL 3.9.2.3.1 General

(a) Where the damage is extensive the remedial procedures shall be agreed in writing with the Employer's Agent.

(b) All repairs shall comply with the requirements of the repair-product manufacturer's data sheet. The Employer's Agent may at his discretion request that repaired coating areas undergo adhesion tests.

(c) The Contractor shall repair any damage occurring during transport, on site during handling, assembly, storage, and erection.

(d) The repaired area shall be tested in accordance with Sub-Clauses 8.4 and 8.12 of SANS 1217 for compliance with the relevant requirements for thickness and electrical insulation defects respectively.

(e) Any item showing electrical insulation defects exceeding an average of five per square metre (a cluster of pinholes within a radius of 25 mm being regarded as a single defective area), or flaking or other signs of loss of adhesion, shall not be repaired. The item shall be blast cleaned and re-coated in accordance with the relevant requirements of the Clause PSL 3.9.2.3.3.

PSL 3.9.2.3.2 Repair Methods for Minor Defects

The repair of areas showing electrical insulation defects or low film thickness shall, if approved by the Employer's Agent, be carried out as follows:

(a) Degrease in accordance with Clause PSL 3.9.2.3.4.

(b) Thoroughly abrade the damaged area, including an adjacent surrounding area of at least 25 mm wide, with a medium grade 220 abrasive paper;

(c) Vacuum-clean the surface to remove dust and debris in accordance with SANS 5769.

(d) Wipe the abraded paint surface with methyl ethyl ketone and allow to dry, and

(e) Apply as many coats of the following repair material as necessary to achieve the specified thickness and finish.

(i) Solvent free epoxy; or
(ii) Fusion-bonded epoxy powder repair kit.

NOTE: Apply a final topcoat over the repaired area to achieve a pleasing, uniform finish of the item.

PSL 3.9.2.3.3 Repair Methods for Major Defects

The total un-coated areas for renovation by the applicator shall not exceed 0.5% of the total surface area of a component. Each un-coated area for renovation shall not exceed 2 500 mm². If damaged areas are larger, the items containing such areas shall be re-coated.

The repair of areas showing damage down to the steel surface shall, if approved by the Employer's Agent, be carried out as follows:

(a) Degrease in accordance with Clause PSL 3.9.2.3.4

(b) Blast-clean all damaged areas to Sa 3 (ISO 8501-1).

(c) Feather the surrounding paint for a distance of 25 mm beyond the damaged areas with a medium grade 220 abrasive paper.

(d) Vacuum-clean the surface to remove dust and debris in accordance with SANS 5769.

(e) Wipe only the abraded paint surface with methyl ethyl ketone and allow drying.

(f) Apply as many coats of the following repair material as necessary to achieve the specified thickness and finish.
(i) Solvent free epoxy or
(ii) Fusion-bonded epoxy powder repair kit.

NOTE: Apply a final topcoat over the repaired area to achieve a pleasing, uniform finish of the item.

PSL 3.9.2.3.4 Degreasing

(a) All surfaces to be coated shall be tested for oil and grease contamination by the water break free test.

(b) Oil and grease contamination shall be removed by:
- Steam-cleaning;
- An emulsifiable or aqueous detergent applied in accordance with SANS 1344; and
- An alkaline cleaning solution.

(b) Allow to react, and then rinse off with clean, potable water to remove all residues prior to surface preparation, all in accordance with Clauses 3.3 and 3.4 of SANS 10064.

(c) The surfaces shall be tested after degreasing and show no oil, grease and chemical contamination after degreasing.

(d) Care shall be taken to avoid entrapment of cleaning agents in recesses or other retention areas.

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 3.9.2.4 REPAIR OF DAMAGED SINTAKOTE

PSL 3.9.2.4.1 General

Damaged Sintakote shall be repaired in accordance with the procedures detailed in the Tyco Handling and Installation Manual for steel pipeline systems for the repair of Sintakote or in accordance with clause 3.2 or clause3.3

PSL 3.9.2.4.2 REPAIR OF SMALL PINHOLE TYPE DEFECTS

PSL 3.9.2.4.2.1 Surface Preparation

- Clean and dry the area to be repaired including the removal of dirt, dust and other contaminants. Slightly roughen the area around the repair for a minimum distance of 50 millimetres using a coarse file or abrasive paper.
- Wipe the surface with a clean dry rag.

PSL 3.9.2.4.2.2 Priming

- Stir the primer to ensure complete mixing prior to application. Apply a thin even coat of Densopol Primer D around the area of repair using a paint brush or roller
- Allow the primer to tack dry(approximately 10 to 20 minutes)

PSL 3.9.2.4.2.3 Tape Wrapping

- Apply Deponsole 60 tape to the repair area ensuring a minimum of 50 mm overlap onto sound coating around the defect area.
- Apply Denso MP/HD P.V.C self adhesive over wrap tape around the full pipe circumference to completely cover the repaired patch.

PSL 3.9.2.4.3 REPAIR OF LARGE AREA OF DAMAGE WHERE STEEL IS EXPOSED

PSL 3.9.2.4.3.1 Surface preparation

Cut out the area of Sinkakote and clean the steel surface in accordance with AS1627.2.Clean and dry the area to be repaired .Slightly roughen the area around the repaired using a course file or abrasive paper. Wipe the surface clean with a dry clean rag.

PSL 3.9.2.4.3.2 Priming

- Stir the primer to ensure complete mixing prior to application. Apply a thin, even coat of Densopol Primer D onto the steel surface and around the periphery of the Sintakote.
- Allow the primer to track dry(Approximately 10 to 20 minutes)

PSL 3.9.2.4.3.3 Filling/Priming

- Cut out a piece of Bitumen Mastic Strip to fit into the bare steel area prior to applying the primer.
- Insert the cut out piece of Bitumen Mastic Strip into the repair area.
- Re-apply a thin even coat of Densopol Primer D over the patch and adjacent area of Sintakote.
- Allow the primer to track dry(Approximately 10 to 20 minutes)

PSL 3.9.2.4.3.4 Tape Wrapping

- Apply Densopol 60 tape to the repair area ensuring a 50mm overlap over the fitted patch.
- Apply Denso MP/HD P.V.C self adhesive over wrap tape around the full pipe circumference to completely cover the repaired patch.

PSL 3.9.2.4.4 SURFACE PREPARATION

All joints shall be fully welded and sealed and all sharp edges and corners ground off to a radius of not less than 1.5 mm. All weld spatter and irregularities shall be removed. Any unsound or damaged edges of sintakote shall be cut back into the sound coating and the edges chamfered.

The surface shall be cleaned by means of power tools to achieve a minimum surface preparation in accordance with AS1627.2 TO CLASS St. 2. All dust, dirt, moisture and grease shall be removed. Slightly roughen the sintakote 100 millimeters both sides of the joint, using a coarse file or abrasive paper. Wipe the surface clean with a dry rag.

PSL 3.9.2.4.5 PRIMING

- Stir the primer to ensure complete mixing prior to application, Apply a thin even coat of Densopol Primer D to the steel and roughened sintakote surfaces using a paintbrush or roller.
- Allow the primer to touch dry (approximately 10 to 20 minutes)

PSL 3.9.2.4.6 MASTIC FILLING

To improve the contours for wrapping the tape, fillet welds, sharp edges of sintakote, test plugs or welding lid holes shall be filled and profiled with Bitumen Mastic Strip. The mastic filling shall be molded such that the Densopol 60 tape can be applied with no sharp edges protruding or air entrapment.

PSL 3.9.2.4.7 TAPE WRAPPING

Commencing at least 100 milliliters back onto the primed sintakote one complete turn of 150 milliliter wide Densopol 60 tapes shall be applied. Release film shall be removed before application. While holding the tape under tension, the pipe shall be spirally wrapped using a 55 percent overlap and finished 100 mm onto the primed sintakote with one complete circumferential wrap around the pipe. The tape shall be cut off in the downward direction of wrapping. New roles of tape shall have the ends overlapped at least 75 mm.

During wrapping the tape shall be smoothed out by hand to exclude any air bubbles or wrinkles and to seal overlaps.

Care shall be taken to prevent any folds or misplacement of the tape, especially under the pipe, and to prevent the tape becoming contaminated during wrapping.

The butt-welds in segmental (lobster bends) are to have the tape applied partial layer by partial layer with a 55 percent overlap until a full spiral wrap can be made (refer sketch in appendix A) continue wrapping onto the primed sintakote for at least 100mm with one complete circumferential wrap around the pipe.

Straight steel pipes shall also be wrapped with Densopol 60 with a 55 percent overlap in accordance with the above clauses.

PSL 3.9.2.4.8 STEEL FITTINGS AND FLANGES

PSL 3.9.2.4.8.1 GENERAL

Procedures for the protection of steel fittings applies to both main pipeline fittings and branch pipe work. Fittings manufactured and coated by Tyco shall be factory coated with Sintakote. Difficult fittings such as valves may be protected using a more conformable petrolatum system in accordance with TS29 only with the approval of an SA Water representative.

PSL 3.9.2.4.8.2 SURFACE PREPARATION

Still surfaces shall be prepared in accordance with clause 4.1.

PSL 3.9.2.4.8.3 TAPE WRAPPING

Prepare and wrap all straight sections leading up to the fitting and flange in accordance with section 4.

PSL 3.9.2.4.8.4 PRIMING

- Stir the primer to ensure complete mixing prior to application. Apply a thin even coat of Densopol Primer D to the prepared steel surfaces and a minimum of 50mm onto the Densopol 60 wrapped areas using a paint brush.
- Allow the primer to touch dry (approximately 10 to 20 minutes).

PSL 3.9.2.4.8.5 MASTIC WRAPPING

Unavoidable sharp edges such as bolts, nuts and collars shall have mastic strip molded over the positions or edges. Strip with a 55 percent overlap onto itself and minimum 50mm overlap onto the Densopol 60 or Sintatoke coated pipe work. Press the Bitumen Mastic Strip firmly into place ensuring no air voids are beneath the Bitumen Mastic Strip.

Note: The Bitumen Mastic Strip provides corrosion protection to the steel work and is similar in composition to Densopol 60, but it does not have a woven carrier.

PSL 3.9.2.8.6 OVER WRAPPING

150 or 100mm wide Denso MP/HD tape (self adhesive PVC) shall be spirally wrapped over the Bitumen Mastic Strip with a 55percent overlap. While wrapping, the Denso MP/HD tape shall be pulled firmly and the lapse properly sealed.

PSL 3.9.2.8.7 TESTING

All repairs and wrapping shall be tested using a high voltage “spark” tester in accordance with AS3894.1 at an operating voltage of 15 KV.

PSL 3.9.3 Protection against electrolytic corrosion

OMIT THE EXISTING CLAUSE AND INSERT THE FOLLOWING:

“All joints and fittings shall be fully wrapped with approved protective tapes. Protective tape shall comply with either Specification A or Specification B as ordered by the Employer’s Agent.

Specification A

This tape shall be made up of pre-bonded components to form a composite single wrap tape. The adhesive inner protective tape must provide complete protection to steel piping against electrolytic corrosion. It shall be impermeable to water, chemically inert and physically stable and must provide a perfect seal at the overlap on a spiral-winding pattern.

The adhesive outer protective tapes shall be tough and impact resistant, providing suitable protection of the inner protective tape against mechanical damage. It shall be stable and not crack or deteriorate when buried. The tapes shall be chemically resistant to all common acids and alkalis normally encountered in the soils at the construction site.

The tapes shall be suitable for both machine and hand application.

The Combination electrical characteristics of the inner and outer wrap together must exceed:

Dielectric strength = 25kV/mm

Insulation = 10 0hm metre

The following minimum criteria shall be satisfied:

	Inner Tape	Outer Wrap
Thickness (mm)	0,3	0,3
Tensile strength (kg/cm width)	3,3	5,0
Elongation at break (%)	200%	50%
Adhesion to primed steel (gm/cm width)	220	220

Specification B

This tape shall be made up of a non-woven synthetic fibre carrier impregnated and coated on both sides with a compound incorporating high melting point bitumen (Densotherm or similar approval). During application the tape shall be correctly heated and laps adequately sealed all in accordance with the instructions and recommendations of the supplier.

Before the application of any protective material, the surface of the pipe shall be thoroughly cleaned and all loose or damaged pipe coating removed. All ridges,

depressions and steps in the surface shall be filled with an approved filler so as to present a smooth uniform surface. After the filler has hardened, the entire surface to be wrapped shall be primed with a primer or otherwise treated as recommended by the supplier of the tape.

The protective tape shall be applied as a spiral wrap with not less than 50% overlap. The width of the tape shall be appropriate for the section to be wrapped."

PSL 3.9.5 Joints, nuts, bolts and washers

DELETE AND REPLACE WITH THE FOLLOWING:

"All bolts and nuts shall comply with the requirements of the relevant sections of SANS 1700 and shall be of Grade 4.6 steel. Washers shall be provided at each nut and shall be of the same material (or coating where applicable to match the bolt and nut. Nuts and bolts subject to vibration shall be machined finished fitted with plain washers and treated with "Loctite" or equivalent.

Bolts other than jacking bolts shall project not less than 3mm and not more than 10mm from the heads of the nuts after tightening.

All bolts to be built into concrete work as well as bolts to be installed above ground level (outside buildings), directly above and under water shall all be of stainless steel grade 304. Bolts for flexible couplings and flanges for underground installation shall be hot dip galvanized. Bolts to be installed inside buildings shall be hot dip galvanized. Galvanizing shall be in accordance with the Standard Corrosion Protection Specification (Heavy coating).

Suitable plastic sleeves and/or washers shall be used for protection against corrosion by bi-metallic action".

PSL 3.9.6 Corrosive soil

ADD THE FOLLOWING TO THE EXISTING CLAUSE:

"Steel pipes, pipe fittings and steel flanges in contact with soil shall over and above the protection as described above be protected as specified in Clause 3.9.3 with "DENSO" tape and/or mastic or approved similar. Application shall be strictly in accordance with the manufacturer's instructions. A polyethylene tape of 300 microns minimum shall be spirally wrapped over the petrolatum tape and fixed to the clean pipe ends with pressure sensitive tape."

PSL 5 <u>CONSTRUCTION</u>

PSL 5.1 LAYING

PSL 5.1.4 Depth and Cover

PSL 5.1.4.2 Cover

ADD THE FOLLOWING TO THIS SUBCLAUSE:

"The minimum cover to finished surface over water mains shall be at least 1000 mm in trafficked areas and at least 800 mm elsewhere. At valves the depth of the pipeline shall be increased if necessary to ensure a minimum cover of 100mm over the valve cap. The cover shall be maintained as close as possible to the minimum without local sags or humps and shall not be increased above the minimum by more than 200mm without the approval of the Employer's Agent."

PSL 5.2 JOINTING METHODS

PSL 5.2.3 Welding

DELETE THE EXISTING CLAUSE AND REPLACE WITH THE FOLLOWING:

a) General

"Field welding of pipes which have been lined will be permitted only for pipes of DN600 and larger where a man is able to enter the pipe to make good the lining after welding and testing in accordance with Clause 7.2 of SANS 1200L has been completed. Pipes of lesser diameter may be field welded where concrete linings will be made after the pipeline has been laid and all welds have been tested and approved.

At the discretion of the Employer's Agent, roll welding will be permitted, provided pipe alignment is maintained by use of skids or of structural framework to accommodate two or more lengths of pipe with an adequate number of roller dollies to prevent sag in the pipe. The entire root bead, however, shall be made with the pipe in a stationary position.

All pipes welded in the trench shall be properly laid and aligned before welding commences. Bell holes shall be excavated at all field welds. The Contractor shall not lift the pipe to provide adequate access for the welders to enable them to stovepipe weld the joint.

The alignment of abutting ends shall be such that the offset will not exceed 1.7 mm. Line up clamps shall be used for joint "fit-ups". The use of "bridges and wedges" or any method that may induce unnecessary stresses is forbidden.

Both ends of coated and lined pipes shall be wrapped for a distance of at least 800 mm on either side of the weld by means of an asbestos mat or other approved material to ensure that weld spatter or other damage is not caused to the coating and lining during the welding process. The pipe trench shall be kept free of all dirt and water in the vicinity of the weld until after all corrosion protection measures have been completed and approved. "

b) Welding procedure and qualification of welders

Steel Pipes

Welding shall be done by only qualified welders who satisfy the requirements of API 1104, Clause 3.0. Before any welding of pipeline materials commences, the qualification of welders shall have been approved, all detailed welding procedure specifications with weld diagrams required for their completion shall have been submitted for approval in a neat form and the welding procedure qualification tests shall have been successfully concluded all in accordance with the relevant standard specifications. Each welder shall mark the pipe adjacent to the weld with the figure assigned to him.

Sufficient records shall be kept by the Contractor to ensure that all field welds can be subsequently identified with the welder concerned.

As far as practicable all out of trench welding shall preferably be done by an automatic submerged process and the Contractor shall provide all necessary plant to carry out this process. MSEAP welding may be used where in-trench welding is done.

Heat treatment for welding shall be in accordance with API 1104 if required by same and the Contractor shall provide an approved shield to protect the pipe joint from wind and weather during heat treatment and welding.

c) Line up

Pipes shall be lined up in such a manner as to prevent damage thereto. If the pipe to be used has a longitudinal seam, these seams shall be staggered by not less than twenty degrees and welded sections, or single lengths, shall be assembled in such a manner that this seam shall remain in the top quadrant of the pipe during coating operations and after lowering into the trench.

d) **Cleaning of pipe ends** Before welding, all foreign matter shall be removed from the beveled ends. If any of the ends of the pipe joints are damaged to the extent that satisfactory welding contact cannot be obtained, the damaged pipe ends shall be cut and beveled with an approved beveling machine. These field bevels of pipe ends shall be made to the satisfaction of the Employer's Agent. Should laminations, split ends, or other defects in the pipe be discovered, the joints of pipes containing such defects shall be cropped, repaired, or removed from the line as designated by the Employer's Agent.

e) Inclement Weather

No welding shall be carried out during rain or high wind unless the welder and joint are adequately protected and sheltered, to ensure that the welding is not impaired.

f)Protection of coatings and linings

Before welding commences, a suitable apron at least 800 mm wide shall be wrapped

around both sides of the area to be welded to ensure that weld spatter does not damage the coating and lining.

g) Butt-welding

Pipes and specials to be joined by field welding shall be supplied with ends beveled for welding. All welding of joints shall comply with API 1104 and only approved type welding rods shall be used. If backing rings are permitted, they shall be placed in position and wedged up or adjusted so that the pipe ends are completely circular and properly mated. The space between abutting pipe ends, when aligned for welding, shall be such as to ensure complete penetration without burn-through. For pipes having the same dimensions, the spacing shall be approximately 1.5 mm. The alignment of the abutting pipe ends shall be such as to minimize the offset between pipe surfaces. For pipes of the same nominal wall thickness, the offset shall not exceed 1.5 mm. Internal line-up clamps shall be used wherever practicable and may be removed after the root bead is 50% completed, provided that the completed part of the root bead is in segments of approximately equal lengths, spaced about the circumference of the pipe. If conditions make it difficult to prevent movement of the pipe, or if the weld will be unduly stressed, the root bead shall be completed before releasing clamp tension.

External line-up clamps shall be used where it is impracticable to use internal line-up clamps. Partial root beads made when using external clamps shall be uniformly spaced about the circumference of the pipe, and shall have an accumulative length of not less than 50% of the pipe circumference before the clamps are removed.

Tack welding shall be carried out to maintain the root gap and position of the pipe ends during the welding proper. The number of tack-welds shall be kept to a minimum but shall not be less than four around the circumference of the pipe.

After proper preparation and tack welding, the root bead shall be carried out followed by successive filler passes, and capper pass in accordance with the approved welding procedure.

The filler and finish beads shall be deposited by an acceptable method and each filler bead shall be approximately 3 mm in thickness. Completed welds shall have a reinforcing of not less than 0.8 mm and not more than 1.5 mm above the pipe surface around the entire perimeter of the weld, and the width of the finish or cover shall be not more than 3 mm greater than the original groove. The number of beads required shall be governed by the wall thickness of the pipe, so that the completed weld will have the reinforcement previously specified; provided, however, that each weld shall consist of at least three beads. No two beads shall be started at the same point. No mitre welds will be permitted, and all welds are to be at ninety degrees (± 5°) to the axis of the pipe. All slag and scale shall be removed from each bead for visual inspection immediately after each bead is run.

In all field butt-welds where it is possible to work inside the pipe, the inside weld shall be done first.

The chemical composition of weld metal and parent metal shall be similar and the inner

weld metal or reinforcement shall not extend more than 1 mm above the inside metal surface of a pipe or special, and any excess shall be removed by grinding.

Defects caused by stray welding arc flashes shall be removed by grinding, provided that the pipe wall thickness is not reduced to less than the specified minimum thickness, otherwise the portion shall be cut out and repaired.

h) Fillet welding

Welding shall be as for butt-welding as applicable. All pipes of 600 mm ND and over shall be welded on both the outside and the inside.

i) Repair of welds

Rectification of defective welds shall be in accordance with API 1104 and to the satisfaction of the Employer's Agent. All costs related to the repair of defective welds shall be borne by the Contractor. Defective welds shall be repaired immediately they are found to be so. The Employer's Agent has the right to stop the Contractor proceeding with further pipe laying in the event of the Contractor delaying the rectification of defective welds. Furthermore, no consideration will be given to any claims arising from delays in construction resulting from such action.

All welded joints which have been repaired shall be 100% radiographed or otherwise tested to the Employer's Agent's satisfaction at the Contractor's own expense.

PSL 5.8 BRICKWORK IN CHAMBERS AND MANHOLES

ADD THE FOLLOWING TO THIS SUBCLAUSE:

"The joints of exposed faces shall be flush-trowelled, hard and smooth and shall be rubbed for the full width of the joint as the work proceeds to give a hard polished finish."

ADD THE FOLLOWING NEW SUBCLAUSE

PSL 5.11 WORK ON EXISTING MAINS

Where connections are to be made to existing mains, the Contractor shall excavate back along the existing main only as far as is necessary to complete the connection satisfactorily and shall ensure that the existing mains are disturbed as little as possible. Backfilling shall be carefully placed and properly compacted beneath existing and new work to ensure that the mains, specials, etc. are properly bedded.

Work on existing mains and components of the reticulation system shall be carefully planned in consultation with the Employer's Agent. The work shall be carried out expeditiously to ensure that the disruption of services and inconvenience to the local residents is kept to a minimum. All tie-ins shall be completed within a maximum of 10 hours.

The Contractor under strict supervision by the Employer's Agent or The Employer will do all these connections.

Hand excavation must be used to expose the existing mains and erf connections where required. While every effort has been made to ensure that the information relating to these connections is correct the Employer's Agent or The Employer takes no responsibility for the accuracy, or for the completeness of the information."

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 5.12 CONNECTION TO THE EXISTING MAINS

The Contractor shall supply all necessary fittings / materials for under pressure connections suitable for all pipe sizes.

The Contractor shall confirm all measurement on site prior to ordering any pipe fittings."

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 5.13 PIPELINE RENEWAL WORK

All material recovered as a result of the repairs or replacement of the components shall be returned to the Contractors store where they shall be cleaned, sorted and listed. A list of the recovered material shall be handed to the Employer's Agent on a monthly basis. All recovered material shall be delivered to the JW Water Depot on a regular basis or at the end of the Contract.

ADD THE FOLLOWING NEW CLAUSE:

PSL 5.14 STERILISING OF WATER MAINS

All new water mains shall be sterilised at 10mg/l free chlorine for 12 hours and will then be thoroughly flushed.

PSL 7 TESTING

PSL 7.2 INITIAL TESTS ON WELDED STEEL PIPES

PSL 7.2.2 Radiographic Examination

Fifteen percent of all welded joints, or when ordered by the Employer's Agent, shall be examined radiographically.

ADD THE FOLLOWING NEW CLAUSE:

PSL 7.2.3 Hydrostatic Test

(a) All pipes and fittings shall be subject to an approved hydrostatic test and to a test pressure determined as follows:

$$P = \frac{2000\ t\ f}{D}$$

Where

P = test pressure in kPa

F = 85 percent of the guaranteed minimum yield strength in MPa for steel plate

D = outside diameter of the pipe in mm

T = wall thickness in mm.

(b) Hydrostatic testing shall not be carried out until all aspects of fabrication have been completed.

(c) The pressure shall be applied steadily by approved means and maintained without variation sufficiently long for proof and inspection.

(d) Should water sweat or ooze from any part or any defects of any nature be discovered the pipe shall be emptied and the defects made good. The pipe shall then be tested again. Should a pipe, after repair, fail to pass the second hydraulic test the Employer's Agent may order its rejection.

(e) The fact that any pipe may have passed the hydraulic test at the works shall not exempt the Contractor from his liability under Clause 7 of the General Conditions of Contract 2015.

(f) If a pipe fails to pass any of the above tests in Clauses PSL 7.2.1, PSL 7.2.2 or PSL 7.2.3, it shall be rejected, but the Employer's Agent may permit repairs or alterations to be made to enable the pipe to pass the test.

(g) The Employer's Agent may require one or more pipes to be tested to destruction. If practicable the Employer's Agent may require the Contractor to repair the pipes and retest them. The cost of repairs will be paid by the Employer as an extra to the Contract."

ADD THE FOLLOWING NEW CLAUSE:

PSL 7.2.4 Testing of HDPE pipes

Sample of the welded joins shall be taken and the following test shall be carried out by an approved laboratory selected by the Employer:

1. Tensile strength on seam weld
2. Elongation at break
3. OIT (Oxidation Induction Time)
4. MFR (Melt Flow Rate)
5. Carbon black content
6. Carbon black dispersion

PSL 8 MEASUREMENT AND PAYMENT

PSL 8.2 SCHEDULED ITEMS

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 8.2.16 c) Demolish Structure

a) Description of connection, types and diameters involved……...Unit: No

b) Etc for the other items

The unit of measurement shall be sum for various types of connection into existing line mains

The rate shall cover the cost of excavation, plant and labour required, demolishing the existing chambers, safeguarding the existing valves and specials from damage and safely disposing of the rubble material.

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 8.2.17 <u>Connect to Existing Mains</u>

a) Description of connection, types and diameters involved……...Unit: No

b) Etc for the other items

The rate shall cover the cost of isolating, cutting, excavation (up to 4 m deep), bedding, dewatering and exposing the existing main at the connection point, supply necessary fittings for under pressure connections for the section of the mains as required, temporary support, safety precaution backfilling and the removal of surplus and unsuitable material.

ADD THE FOLLOWING NEW SUBCLAUSES:

PSL 8.2.18 <u>Recover valves, fittings, specials, etc</u>

a) Description of item……Unit: No.

b) Etc for other item

The unit of measurement shall be number of described item to be recovered

The rate for the recovery of the above shall cover the cost of the excavation, breaking out existing brick or precast concrete, and removal of the valves, fittings and specials removal of debris and spoil to Contractor's dump site and importing suitable backfill material, the plugging with concrete of the open ends of the abandoned water mains, the removal of the surface boxes, backfilling to required density, the handling and transporting of the recovered materials to the Ennerdale Depot, the listing of the salvaged materials and the backfilling and compaction of the chambers and reinstatement of surface covering.

PSL 8.2.19 <u>Supply and install Valves</u>…….....Unit: No

a) Gate Valves

All gate valves shall be flanged wedge type isolation valves to SABS 664, Class 16, anti-clockwise closing. All valves 400 mm and bigger are to be supplied with an approved **open gear box assembly** as follows:.

1. For the 600mm Valve:

Multi-Stage Spur gearing with 6:1 minimum ratio, having operating spindles on the input spindle and at a stage where the valve can be stroked without exceeding the maximum input torque of 275Nm if no differential pressure is applied to the valve.

1.1 For the 450mm Valve:

Single-Stage spur gearing with 4:1 ratio having one spindle to operate with a 1:1 ratio and a second spindle to operate with a 4:1 ratio. A maximum input torque of 240Nm is recommended.

2. The gears shall be robust and machine cut and their mounting shall be of substantial design.

3. Each pinion gear spindle shall be supported between two bearings or alternatively one bearing of sufficient depth to prevent misalignment of the opinion gear and spindle. The bearings shall be fitted with bronze bushes and shall be provided with grease nipple lubricating points and shall be lubricated prior to delivery. All points to be lubricated shall be fitted with 1/8 inch BSP straight nipples for grease-gun lubrication. Adequate lubrication shall be provided for all gear and indicator bushes.

4. All valves shall open by anti-clockwise rotation of the main spindle and gearboxes shall be fitted with an intermediate idler where necessary.

5. In the case of Type A and Type B gearing a shear pin or other safety device shall be incorporated between the high and low gears to prevent damage to the valve if excessive force is applied. Two spare pins shall be attached to each valve.

6. Shear pins shall be easily replaced in the field. Hard-driven pins will not be accepted as shear pins.

b) Air Valves

Air valves must be double acting air valves of compact single chamber design with both small and large air release orifices inside the chamber. The valve must also act as a vacuum breaker, with intake capacities of 60 % of discharge rates given.

The unit measurement for valves shall be number of each described assembly

The rate shall include supply installation and testing including for all corrosion protection, bolts, gaskets, and any other contingency work.

f) Valve Boxes for Valve not exceeding 350mm

Sterling Concrete CC or similar approved precast concrete valve (hydrant) box stacked segments shall be used. A Type 5 standard Polymer cover shall be used with Johannesburg Water inscription on it.

PSL 8.2.20 **Cathodic Protection**…….....Unit: Sum

The rate shall include investigation, design, supply and commission system as per specified and/ or instructed by the Employer's Agent (Provisional Sum)

PSL 8.2.21 **Supply and install fittings assembly**…….....Unit: No

The unit of measurement shall be number of a described item to be installed. The applicable particular specification contained herein on various clauses will apply to the various pieces, for example **PSL 8.2.19** will be applicable to any valve and air valve in the assembly.

The rate shall include supply installation and testing including for all corrosion protection, bolts, gaskets, and any other contingency work to enable the proper operation of the fittings assembly.

PSL 8.2.22 **Laboratory testing of HDPE joins**…….....Unit: Prov Sum

The Employer's Agent shall set aside an amount as Provisional Sum for laboratory testing of HDPE welding joins. The amount shall cover the cutting, transportation and laboratory test of the sample joins.

PSL 8.2.23 **Removal of damaged pipes**……Unit: m

All pipes that have been removed from the excavations are spoiled within 48 hours of excavation failing which the Employer's Agent shall be entitled to suspend work under the Contract.

The rate shall include the complete (labour, plant and equipment) cost for the removal of such material.

PSL 8.2.24 **Trenchless technology**

PSL 8.2.24.1 **Supply and Installation of pipe through pipe cracking……..Unit: m**

The rate shall include the complete (labour, qualified operators, material, plant and equipment) cost for the successful pipe cracking of the pipe, installation and supply of pipes of various diameters, jointing of pipe, launching and reception pits. The rate shall also Include the provision and operation of all equipment and accessories, provision and application of all materials, safety equipment (including that required for the Employer's Agent or his duly authorized representative's sole use), traffic accommodation and testing and reporting.

PSL 8.2.24.2 Supply and Installation of pipe through Horizontal Direction Drilling (HDD)…….
Unit: m

The rate shall include the complete (labour, qualified operators, material, plant and equipment) cost for the successful drillin of the pipe, installation and supply of pipes of various diameters, jointing of pipe, launching and reception pits. The rate shall also Include the provision and operation of all equipment and accessories, provision and application of all materials, safety equipment (including that required for the Employer's Agent or his duly authorized representative's sole use), traffic accommodation and testing and reporting.

PSLB BEDDING (PIPES)

PSLB 3 MATERIALS

PSLB 3.1 SELECTED GRANULAR MATERIAL

REPLACE THE CONTENTS OF THIS SUBCLAUSE WITH THE FOLLOWING:

"Selected granular material shall have a PI not exceeding 10 and shall be free from sharp-ended particles or particles exceeding 19 mm in size."

"Selected fill material shall have a PI not exceeding 15 and shall be free from sharp-ended particles or particles exceeding 19 mm in size."

PSLB 3.3 BEDDING

ADD THE FOLLOWING:

"uPVC and HDPE pipes are deemed to be flexible pipes for the purposes of this subclause."

PSLB 3.4 SELECTION

PSLB 3.4.1 Suitable material available from trench excavation

REPLACE THE WORDS "(but is not required)" *IN THE FIFTH LINE WITH THE WORDS* "(at his own cost)".

PSLB 7 TESTING

PSLB 7.1 DENSITY

REPLACE THE SECOND SENTENCE IN THE FIRST PARAGRAPH WITH "The test will be carried out using the Troxler method."

ADD THE FOLLOWING SUB-CLAUSE

PSLB 7.1.1 Submission of bedding compaction test results

The Contractor will be required to submit to the Employer's Agent four (4) compaction test results of bedding for every 100metres. Bedding compaction to be 90% MOD AASTHO density. The compaction tests to be performed by the Troxler method.

PS15.1.1 PSLB 8 MEASUREMENT AND PAYMENT

PSLB 8.1 PRINCIPLES

ADD THE FOLLOWING TO THIS SUB-CLAUSE

PSLB 8.1.3 Volume of bedding materials

The volume of bedding material shall be measured net i.e. the volume of the pipe is to be deducted.

PSLB 8.1.5 Disposal of displaced material

DELETE THIS SUB-CLAUSE AND REFER TO CLAUSE PSDB 5.6.3:

PSLB 8.1.6 Free-haul

DELETE THE WORDS "of 0,5 km" *IN THE FIRST LINE OF THIS SUBCLAUSE.*

PSLB 8.2 SCHEDULED ITEMS

PSLB 8.2.1 Provision of bedding from trench excavations

DELETE THIS SUB-CLAUSE AND REPLACE WITH THE FOLLOWING:

Without the need for screening or other treatments:

a) Selected granular material.....Unit: m^3

b) Selected fill material.....Unit: m^3

The rates shall cover the cost of acquiring, from any point along the trench excavation as be Selected by the Employer's Agent within 5,0 km, bedding that complies with the relevant requirements of the specification, of delivering it to points alongside the trench spaced to suit the Contractor's methods of working, and of disposing of displaced material within a free haul distance 5,0 km.

Including for screening and/or other treatment:

a) Selected granular material.....Unit: m^3

b) Selected fill material.....Unit: m^3

The rates shall cover the cost of screening by means of mesh sieves or otherwise treating excavated material, at any point along the trench excavation as may be selected by the Employer's Agent, in order to produce bedding that complies with the relevant specification, delivering it to points along the trench, within 5,0 km, spaced to suit the Contractor's methods of working, of making good any backfill deficiency there may be from points where screened backfill material has been acquired, and of disposing of displace material within a free haul distance of 5,0 km.

PSLB 8.2.2 <u>Supply only of bedding by importation</u>

PSLB 8.2.2.3 From commercial sources (Provisional)

ADD THE FOLLOWING SUB-SUBITEM TO THIS CLAUSE:

"(c) Special bedding material

1) Description of material…….…… Unit: m^2 or m^3

2) Etc for other items

The unit of measurement shall be the square metre or cubic metre of material as specified.

The rate shall cover the cost as specified for (a) and (b)." The rate shall include the cost of acquiring from commercial sources, transporting regardless of distance, off loading and placing in the trench bottom clean where ordered by the Employer's Agent.

ADD THE FOLLOWING SUB-SUBCLAUSE:

PSLB 8.2.6 Compaction Test

Compaction testing using the troxler method……..……..Unit: No

PSLC CABLE DUCTS

PSLC 3 MATERIALS

PSLC 3.1 DUCTS

ADD THE FOLLOWING:

PSLC 3.1.1 Split uPVC pipes

Split pipes shall only be used to provide ducts for existing services that cannot be severed and threaded through the ducts. The pipes shall be cut accurately in the middle, and opposite halves shall be matched as sawn. Split pipes shall be placed around the service, firmly bound by steel straps, and encased in concrete."

PSLC 3.4 CABLE DUCT MARKERS

ADD THE FOLLOWING:

"A cable duct marker shall consist of a 300 mm x 300 mm x 100 mm deep, class 20 MPa/19 mm concrete block, connected by means of a non-ferrous metal strip to a temporary plug to seal the end of the duct. The plug shall prevent moisture or soil from entering the duct. The metal strip shall be firmly connected to both the plug and the concrete block. The concrete block shall be positioned not further than 0,5 m horizontally from the end of the cable duct. The face of the concrete block shall be clearly marked "E" to indicate electricity cables."

PSLC 8 MEASUREMENT AND PAYMENT

PSLC 8.2 SCHEDULED ITEMS

PSLC 8.2.5 Supply, lay, bed and prove duct

REPLACE THE PAYMENT PARAGRAPH WITH THE FOLLOWING:

"Separate items are scheduled for each diameter of duct.

The rates shall cover the cost of providing all the materials and the cost of laying the ducts, installing the draw wire, jointing, bedding and providing all as specified."

Johannesburg Water (SOC) Ltd

CONTRACT NO: JW14508

MAYFAIR WATER PIPE REPLACEMENT

VOLUME 2

PART 4: SITE INFORMATION

Employer:		Contractor	
Witness:		Witness:	

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Employer:		Contractor	
Witness:		Witness:	

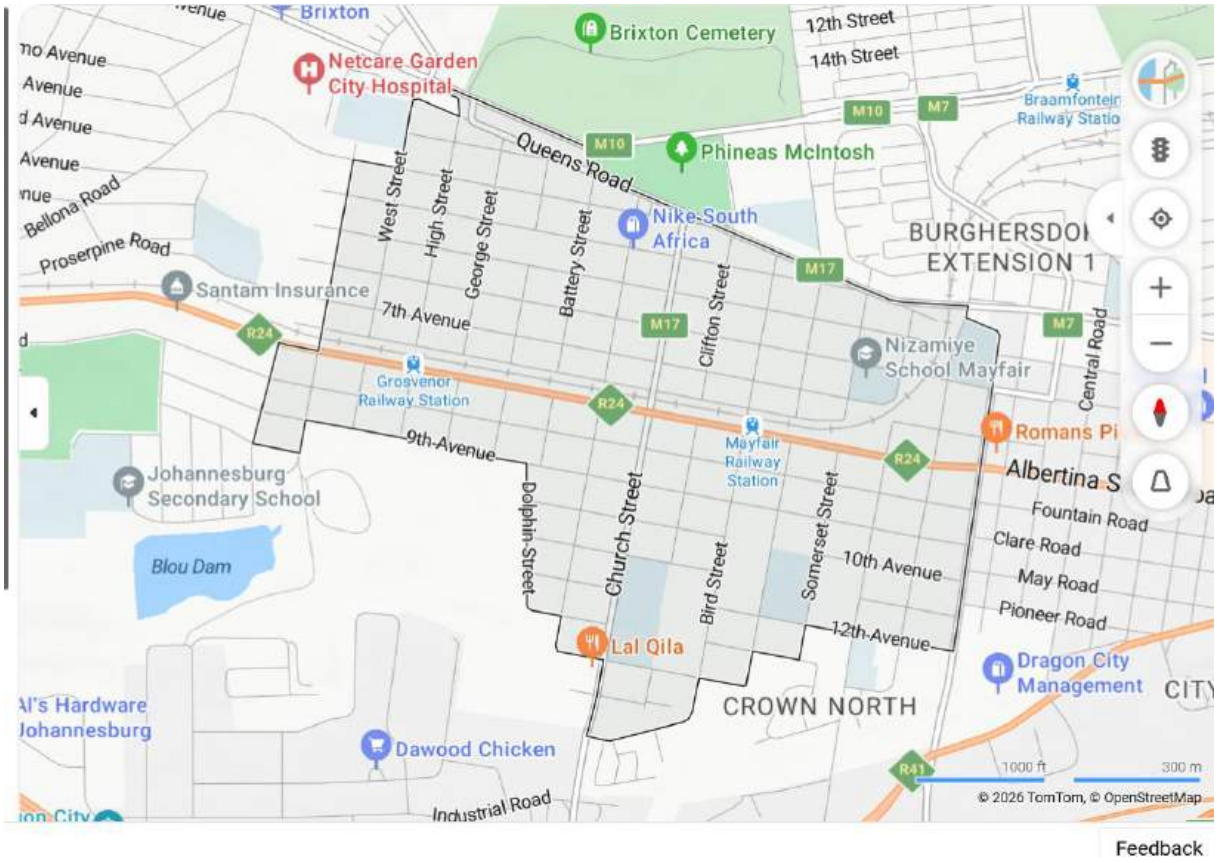
C4 SITE INFORMATION

C4.1 GENERAL

This section describes the site at the time of tender to enable the tenderer to price his tender and to decide upon his method of working and programming and risks.

C4.2 SITE LOCATION

The project is located in Mayfair suburb in Region F within the City of Johannesburg.



C4.3 ACCESS TO SITE AND RESTRICTIONS

Any permission as may become necessary shall be the responsibility of the Contractor to obtain.

Having been granted access to works areas by the Employer, and other service authorities, the Contractor shall adhere to any agreed conditions of access and ensure the works area is left in a condition similar to when it was first accessed.

Employer:		Contractor	
Witness:		Witness:	

The Contractor shall provide temporary access to the works as may be required by him and to the approval of the Employer's Agent.

The Contractor shall have to obtain permission from JRA/GAUTRANS to execute the works required as part of this Contract. Any other permission as may become necessary shall be the responsibility of the Contractor to obtain.

Having been granted access to works areas by the Employer, other service authorities and private owners, the Contractor shall adhere to any agreed conditions of access and ensure the works area is left in a condition similar to when it was first accessed

No restriction on access to the site of works will 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's staff shall be identified by either clothing bearing the contracting companies name or an identification tag, which shall be displayed when entering the site of works.

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

C4.4 EXISTING SERVICES, SERVITUDES AND WAYLEAVES

Approximate positions of existing underground services are indicated on the construction drawings and wayleave approval drawings by service providers. The services must be located by hand and any deviation of the positions of such services must be reported to the Engineer immediately. Should the Contractor find underground services, which are not indicated on the construction drawings at all, the Engineer must be notified immediately. In both cases the Engineer shall assess the situation and instruct the Contractor on an appropriate course of action to be taken.

The attention of the Contractor is drawn to the fact that many services share the same footway.

Should the Contractor damage an existing service he shall immediately contact the Engineer who will investigate the matter and determine liability for the damage.

All cables and pipes shall be considered "live" unless confirmed otherwise by the relevant authority.

The positions of known services cannot be guaranteed. On establishing on Site, the Contractor must determine the positions of all existing services in the various areas of work. The Contractor must take precautions to prevent any damage to existing services and infrastructure. Damages which might occur will be repaired at the cost of the Contractor.

It is envisaged that no permits or wayleaves will be required.

For detailed specification the Contractor shall refer to clauses PS 1.5 (Temporary Works), PS 4.4 (Existing services), and PS 4.8 (Permits and wayleaves), Part 3: Scope of Work.

Employer:		Contractor	
Witness:		Witness:	

C4.5 SECURITY

The Contractor shall be responsible for the security of his personnel, materials and construction plant on and around the site of the Works and for the security of his camp, and the Client in this regard will consider no claims.

Refer to clause PS 6.1 (Security)

C4.6 NATURE OF GROUND AND SUBSOIL CONDITIONS

The Contractor shall satisfy himself concerning all matters relating to the nature the ground and subsoil conditions in terms of the General Conditions of Contract. Provision is made in the Bill of Quantities for the importing of materials for pipe bedding, deficiencies in backfilling and for material tests as required by the Employer's Agent.

C4.7 GEOTECHNICAL REPORT

No Geotechnical Report is available.

C4.8 HYDROLOGICAL REPORT AND FLOODLINES

No hydrological and flood lines report available.

Employer:		Contractor	
Witness:		Witness:	

ANNEXURE 1: SOP SMME RECRUITMENT

Employer:		Contractor	
Witness:		Witness:	

Johannesburg Water		**Reference No.: SOP – KPI Ref No. 07** **Developed By: Sizwe Kunene & Joseph Mokoala** **Engineering Services Unit** **Programme Management Unit** **Stakeholder Relations and Communication Department** **Issue No: 1**
PROCEDURE • **Support of SMME Recruitment for Main Contractors**		**Review: Nov 2023** **Effective Date: 01 December 2023**

1. PURPOSE

To outline interim processes to be followed by CAPEX and Stakeholder Relations and Communication (SRC) Departments in the recruitment of SMME's within communities where projects are implemented. The objective is to ensure all **internal** project teams are consistent and adhere to the processes to promote transparency, fairness and compliance to special conditions of subcontracting in each SMME tender document.

2. RISK

The following are identified risks relating to non-compliance with the Standard Operating Procedure for SMMEs recruitment process and reporting:

- Work stoppages by communities when SMMEs Recruitment Process is not followed in a transparent and fair manner. This may result in service delivery delays, standing time costs incurred on various projects which may result in fruitless expenditure.
- Material irregularities if SMMEs who do not comply with the administrative SMME tender advert requirements are appointed.
- Material irregularities if the subcontracting opportunities created are not reported and achieved.
- Not meeting CAPEX's SMMEs Development Strategy targets

3. SCOPE

This step by step process flow focuses on activities, responsibilities and controls to be implemented by the project team at each step that will enhance transparency and fairness during the recruitment process of SMMEs within the communities where

projects are being implemented. It provides for the evaluation criteria, adjudication process, reviewing, validating of the SMMEs locality in relation to project location and approval of the process. In addition, the performance requirements for reporting, reviewing and validating of the information utilised to report the number of SMMEs opportunities as part of quality assurance is also discussed. The process outlined below also provides for the method to record, file and report information created during the verification process. This SOP includes only those activities performed by the project team in the recruitment process and reporting.

A: ADVERTISING SMME TENDER

No.	Task Description	When	Responsible Personnel	Process Reviewer	Task Approver	Deliverable	Indicative timelines (Task duration)
1.	Identification of SMMEs scope in line with the main contract requirements and creation of bills of quantity	A day after Contract Handover	Contracts Manager	Employers Agent	Project Manager	SMME BOQ	2 days
2.	Project brief to Stakeholder Relations Department for activation of all relevant stakeholder engagement outputs	After public participation is completed in affected areas, 2 days after CLO/s are appointed	Contracts Manager and Employer's Agent	Project Manager & Employer's Agent	Stakeholder Relations Specialist	Integrated stakeholder engagement plan	2 days
3.	SMME Tender advert(s) for SMMEs opportunities (SMME Tender *advert to include tender box location for submission purposes. Tender box to be located at the site camp. Should the site camp be*	After project brief to stakeholder relations department	Contracts Manager & Employer's Agent	Project Manager	Stakeholder Relations Specialist	Approved SMME Tender Advert	1 day

No.	Task Description	When	Responsible Personnel	Process Reviewer	Task Approver	Deliverable	Indicative timelines (Task duration)
	not established at the time, tender box located at the RD's office.)						
4.	Submission of SMME tender advert to the CLO & Region	A day after advert approval and after CLO appointment	CLO	Stakeholder Relations Specialist	Employers Agent	SMME Tender advert submission	1 day
5.	Posting of SMME tender adverts	A day after SMME tender advert submission	CLO & Region	Stakeholder Relations Specialist	Stakeholder Relations Manager	SMME Tender Advertisement	1 days
6.	SMME Tender advertisement duration	A day after posting SMME tender advert	Contracts Manager	Employer's Agent	Project Manager	N/A	7 days
7.	SMME Tender Briefing At the relevant/appropriate place by RD & J	Date indicated on advert	Contracts Manager, CLO, Project Manager, Employer's Agent & RD's Office Representative	Stakeholder Relations Specialist & RD's Office	Employers Agent	SMME Tender Briefing Attendance Register & minutes	1 day
8.	SMME Tender Closing (*All responsible personnel are jointly to ensure that all processes are fairly adhered to*)	Date indicated on the advert	Contracts Manager, CLO, Project Manager, Employer's Agent & RD's Office Representative	Employers Agent	Project Manager & Stakeholder Relations Specialist	SMME Tender Closing Register and all SMME tender submissions	1 day

B. EVALUATION & ADJUDICATION OF SMME TENDER

No.	Task Description	When	Responsible Personnel	Process Reviewer	Task Approver	Deliverable	Indicative timelines (Task duration)
9.	**Gatekeeper: Confirmation of SMME's physical residence (including all JV Partners)** ****take note of statement below under "Notes" for JV compliance.***	A day after SMME tender closing	RD's Office Representative	Stakeholder Relations Specialist	RD's Office Representative, CLO & Stakeholder Relations Manager	IEC list confirmation to be attached on the adjudication report. minutes signed by the CLO and the RD's Office	3 days
10.	Administrative & technical Evaluation of SMMEs (in terms of criteria stipulated on the SMME tender advert).	A day after confirmation of director's residence	Contracts Manager or Site Agent and CLO.	Stakeholder Relations Specialist – *only to physically observe-process*	Employer's Agent	Evaluation Report including evidence, reasons for elimination	3 day (dependant on number of responses)
11.	Administrative Compliance and experience	Valid CK registration or CIPC certificate, Director's SA ID documents, active status of CSD, CIDB status in line with the allocated work, Specific Goals (not disqualifying criteria), Tax Certificate with a valid pin number, COIDA, or any other applicable document/s required on the SMME tender advert					3 days (dependant on number of responses)
12.	Evaluation on price *where applicable*	SMMES are to be evaluated on price and Specific Goals (In terms of Regulation 4(2) and 5(2) of the Preferential Procurement Regulations 2022) and the highest scoring SMME to be awarded based on 80/20 or 90/10 as applicable on each SMME tender.					1 day (dependant on number of responses)
13.	Compilation and submission of Adjudication report	A day after concluding item 9, 10, 11 and 12 above	Site Agent & CLO	Contracts Manager	Employer's Agent	Submission of adjudication Report	5 days
14.	Approval of adjudication report	A day after submission of adjudication report	Contracts Manager	Employer's Agent	Project Manager	Approved adjudication report	2 days
15.	Issuing of Appointment letter	A day after approval of	Contracts Manager or Site	Employer's Agent	Project Manager	Issuing of Appointment letters and	1 day

No.	Task Description	When	Responsible Personnel	Process Reviewer	Task Approver	Deliverable	Indicative timelines (Task duration)
	(appointment letter should be with condition "subjected to not receiving an appeal) to successful SMMEs and Notification of unsuccessful SMMEs	adjudication report	Agent & CLO			Notification Letters	
16.	Review and approval of SMME Contract Document *(Annexure A – typical contract)*	A day after SMME signs the Appointment letter	Contracts Manager to compile	Employer's Agent	Project Manager	Approved Draft Contract	2 days
17.	Submission of signed contract agreement to the Employers Agent	(within a week after signing of SMME appointment)	Contracts Manager	Employer's Agent	Project Manager	Approved signed SMME contract	1 day

Notes:

- *Given that the Subcontracting is developmental in nature, it is discouraged for SMME's to form joint ventures, however in the event that they do, both parties of the joint venture should be represented at the briefing session, and they should satisfy the specific Region's locality requirements as outlined in no.8 above. Failure to attend the briefing session by both parties would result in disqualification and the submission will not be considered for evaluation.*
- *The timelines highlighted above are indicative and not cast in stone.*
- *Most of the 16 activities can be undertaken in parallel and it is highly recommended that the SMME appointment process be undertake in the 28 days where the contractor is preparing for contractual documents.*
- *The above SOP is a JW procedure to Support SMMEs Recruitment for Main Contractors that will be utilised in the interim until a City wide SMME recruitment policy document has been approved. It does not therefore override the current procurement regulations, however its objective is to provide reasonable transparent and fair SMMEs procurement process in an endeavour to support SMMEs through community upliftment projects.*

- *The appointed SMME's will be enrolled onto the JW database for future reference through the facilitation of JW SCM.*
- *Programme Manager/s are to oversee the entire process stipulated on this SoP.*
- *If an addendum is issued, the SMME tender closing date is to be extended by 3 days*
- *All appointments are to be subjected to 14 days cooling period.*
- *Once SMMEs have been appointed, Supply Chain Management Unit (SCMU) must be notified by the Project Manager for SCMU to:*
    - *Enrol the appointed SMMEs onto the chain database for future reference.*
    - *To monitor compliance of the SMMEs for the duration of the project.*

Limitations

Administrative compliance evaluation will be limited to the physical verification of documents provided by SMMEs as the Project Team and contractor personnel involved in the evaluation process do not have access to such tools as CSD or procure check.

SIGN – OFF

Reviewed by: Senior Manager: Engineering Services Unit..... Date: 14/11/2023

Reviewed by: Senior Manager: Project Management Unit..... Date: 15/11/2023

Reviewed by: General Manager : CAPEX..... Date: 16/11/2023

Reviewed by: Senior Manager: Supply Chain Management ..... Date: 16/11/2023

Reviewed by: Manager: Stakeholder Relations ..... Date: 16 Nov 23

Reviewed by: Executive Manager: Stakeholder Relations and Communications..... Date: 05/12/2023

Approved by: Chief Operations Officer..... Date: 07/12/2023

ANNEXURE 2: SOP SR& COMMUNITY ENGAGEMENT CLO SMME EPWP RECRUITMENT PROCESS

Employer:		Contractor	
Witness:		Witness:	

City of Johannesburg

Johannesburg Water SOC Ltd

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SOP PROJECT AND RELATED COMMUNICATION PROTOCOLS JUNE 2025

Title	SOP Project Communication Process	Amendment no:	N/A
Reference:	PCP 01	Effective date:	
Procedure no:	1	Page no:	01
Developed by:	Manager: Stakeholder Relations		

1. BACKGROUND

The 2017 project communication process document required amendments due to the evolving nature of the social engineering and policy guidelines.

2. PURPOSE

The purpose of this document is to outline the communication process to be followed during the implementation of the various infrastructure upgrading and rehabilitation projects within the City of Johannesburg.

3. OBJECTIVE

The objective of this document is to enhance a smooth project communication process, enhance stakeholder engagement and facilitate external social engineering to ensure the successful implementation of each project. It also seeks to clarify the grey areas with regard to the responsibilities of the Stakeholder Relations Specialists in their Regions.

Directors:
Ms Dineo Majavu (Chairperson), Mr Ntshavheni Mukwevho (Managing Director and Executive Director),
Mr Kgaugelo Mahlaba (Chief Financial Officer and Executive Director), Mr Sipho Mthembu, Ms Zandile Meeleso, Mr Pholoso Matjele,
Mr Kgaile Mogoye, Mr Molate Mashifane, Ms Pamela Mabece, Mr Collen Sambo, Mr Makoko Makgonye, Ms Thabiso Kutumela,
Mr Kefiloe Mokoena

Ms Kethabile Mabe (Company Secretary),
Johannesburg Water SOC Ltd
Registration Number: 2000/029271/30

City of Johannesburg

Johannesburg Water SOC Ltd

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Project communication entails communication process among the key internal stakeholders: CAPEX departments; Stakeholder Relations Department and Operations Department, as well as the key external stakeholders: The Regional Director; Ward Governance and the affected Ward Councillors.

4. RISKS

- Project stoppages;
- Lack of buy in from political/local leadership and structures;
- Lack of ownership by the beneficiary of the CAPEX project;
- Vandalism of infrastructure.

5. DELIVERABLES

- Management of project communication
- Management of stakeholder engagement
- Accurate project information shared with stakeholders
- Agile process flow for project communication both internally and externally
- Reputation management
- Reduction in the number of project stoppages as a result of poor communication.

6. THIS SOP IS APPLICABLE TO THE FOLLOWING DEPARTMENTS

- Stakeholder Relations and Communication
- CAPEX
- Operations

7. PROJECT PUBLIC PARTICIPATION PROCESS

CAPEX is required to send an invitation for the project initiation meeting to the Stakeholder Relations Manager. The relevant Stakeholder Relations Specialist will be required to introduce the project in the following stages:

- Introduction of the project to key external stakeholders, namely, Regional Director, Ward Governance and respective Ward Councillor.

Directors:
Ms Dineo Majavu (Chairperson), Mr Ntshavheni Mukwevho (Managing Director and Executive Director),
Mr Kgaugelo Mahlaba (Chief Financial Officer and Executive Director), Mr Sipho Mthembu, Ms Zandile Meeleso, Mr Pholoso Matjele,
Mr Kgaile Mogoye, Mr Molate Mashifane, Ms Pamela Mabece, Mr Collen Sambo, Mr Makoko Makgonye, Ms Thabiso Kutumela,
Mr Kefiloe Mokoena

Ms Kethabile Mabe (Company Secretary),
Johannesburg Water SOC Ltd
Registration Number: 2000/029271/30

City of Johannesburg

Johannesburg Water SOC Ltd

Turbine Hall
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Johannesburg Water
PO Box 61542
Marshalltown
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- Introduction of the project to the community in a public meeting coordinated through official protocols.

DESCRIPTION	RESPONSIBILITY
7.1. **INTERNAL COMMUNICATION PROCESS WITH CAPEX** This section outlines the process of internal communication to be followed in preparation of the implementation of any project. This preliminary internal process will involve the following activities: • Capex should introduce the contractor to the Stakeholder Relations Manager through the project handover meeting • Submit the project implementation plan to the Stakeholder Relations Manager for allocation to the regional Stakeholder Relations Specialist. • Submit the SMME briefing document. • Scope of work or nature of work to be done, project location, value, duration, estimated number of labourers to be employed, rate at which the labourers will be paid and the overarching benefits of the project. • Relevant information relating to the appointment of local sub-contractors and suppliers.	Stakeholder Relations Manager Stakeholder Relations Specialist CAPEX Project Lead
Upon receipt of the above-mentioned information, the Stakeholder Relations Department will verify the following information about the project: • The township, region, ward and Ward Councillor where the project is being implemented. • Facilitate the process for the appointment of the Community Liaison Officer (CLO). The public participation process lead by the Stakeholder Relations Specialist will be activate when all the above is completed.	Stakeholder Relations Manager Stakeholder Relations Specialist CAPEX Project Lead Regional Ward Governance Ward Councillor
7.2. PUBLIC PARTICIPATION PROCESS The project introduction meeting will be arranged with the Regional Director's office where the Ward Governance and the Ward Councillor should be in attendance. This is where the contractor will be introduced, therefore, their attendance is crucial,	Stakeholder Relations Manager Stakeholder Relations Specialist Regional Director Regional Ward Governance Ward Councillor

Directors:
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followed by a public meeting that will be organised by the Ward Councillor and chaired by the Councillor or officially delegated representative.	Main Contractor
7.3. INTERNAL COMMUNICATION WITH THE OPERATIONS DEPARTMENT The Operations department is required to communicate with the Stakeholder Relations Department about: • Planned and unplanned service disruptions. • Placement and location of stationary tankers in informal settlements. • Roaming tankers schedules and locations.	Stakeholder Relations Manager Communication and Marketing Manager Senior Manager: Networks
7.4. **ROLE OF THE STAKEHOLDER RELATIONS DEPARTMENT** The following are the key activities to be conducted by the Stakeholder Relations and Communication Department to ensure the successful implementation of Johannesburg Water's Infrastructure Upgrading and Rehabilitation Projects: Inform and communicate to key external stakeholders Introduce projects in public meetings as per ward governance internal processes Facilitate the employment of the Community Liaison Officer by: o Issuing of an advert to the contractor o Management of the interview process for the CLO o Conduct induction on roles and responsibilities of the CLO o Management of the CLO o Attend site meetings and other relevant meetings where possible o Provide social engineering support to the project team o Put together and manage a file for each project in relational to SRC's portfolio (attendance registers; agenda, minutes and resolutions tracker). Educate communities about proper use of stationary tankers in informal settlements Issue tanker schedules on all relevant media platforms as per communication protocols.	Stakeholder Relations Manager Communication and Marketing Manager

8. FORMS/RECORDS

- Project file (attendance registers; agenda, minutes and resolutions tracker).
- Media releases and related digital and social media report.

Directors:
Ms Dineo Majavu (Chairperson), Mr Ntshavheni Mukwevho (Managing Director and Executive Director),
Mr Kgaugelo Mahlaba (Chief Financial Officer and Executive Director), Mr Sipho Mthembu, Ms Zandile Meeleso, Mr Pholoso Matjele,
Mr Kgaile Mogoye, Mr Molate Mashifane, Ms Pamela Mabece, Mr Collen Sambo, Mr Makoko Makgonye, Ms Thabiso Kutumela,
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This is an SOP between the Stakeholder Relations and Communication Department, CAPEX and Operations Department.

Bonginkosi Xaba Manager: Stakeholder Relations	Signature:	Date: 09/07/25
Nombuso Shabalala Manager: Communication and Marketing	Signature:	Date: 08/07/2025
Approved by: Mzakhe Mtsweni General Manager: Operations	Signature:	Date: 08/07/2025
Co-Approval by: William Chitsa General Manager: CAPEX	Signature:	Date: 9/7/2025
Co-Approval by: Nondumiso Mabuza Executive Manager: Stakeholder Relations and Communication	Signature:	Date: 09/07/2025

Directors:
Ms Dineo Majavu (Chairperson), Mr Ntshavheni Mukwevho (Managing Director and Executive Director),
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Mr Kefiloe Mokoena

Ms Kethabile Mabe (Company Secretary),
Johannesburg Water SOC Ltd
Registration Number: 2000/029271/30

	OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION	
Johannesburg Water	PROJECT NUMBER:	UR 1300
	PROJECT LOCATION:	Mayfair
	PROJECT DESCR:	Provision of emergency work - Mayfair

VOLUME 2

OCCUPATIONAL HEALTH & SAFETY SPECIFICATION

UR 1300

PROVISION OF EMERGENCY WORK - MAYFAIR

Prepared by: OHS Department PO Box 61542 Marshalltown 2107 Tel: +27 11 688 1476	**PRINCIPAL CONTRACTOR:**	
	CEO (16.1 APPOINTEE):	
	TELEPHONE NUMBER:	
	FAX NUMBER	
	E-MAIL ADDRESS:	
	SIGNATURE:	

General Notification

This document forms an integral part of the Contract Specification and, in particular, shall constitute the Client's (Johannesburg Water SOC Ltd.) Occupational Health & Safety & (OHS) Specification, as required by the Construction Regulations, 2014, as promulgated under the Occupational Health and Safety Act (Act no. 85 of 1993). The Specification shall furthermore be applied for the management of Mandatories performing activities for or on behalf of Johannesburg Water SOC Ltd, irrespective whether the contract work constitutes construction work or not.

The Contract Specification is contained in Volume 1 of the contract documents in Part 3: Scope of Work.

Acknowledgements

This Occupational Health & Safety & (OHS) Specification was developed by the internal OHS Department for the sole use by Johannesburg Water SOC Ltd. The issue date of this SHE Specification is September 2016.

ABBREVIATIONS

Abbreviation	Description
CR	Construction Regulations
COID	Compensation for Occupational Injuries and Diseases
DoL	Department of Labour
GAR	General Administrative Regulations
GMR	General Machinery Regulations
GSR	General Safety Regulations
HCS	Hazardous Chemical Substances
HIRA	Hazard Identification and Risk Assessment
JW	Johannesburg Water (SOC) Ltd
MSDS	Material Safety Data Sheet
OHS	Occupational Health and Safety
PPE	Personal Protective Equipment
PER	Pressure Equipment Regulations
SANS	South African National Standards
SABS	South African Bureau Standard
SHE	Safety, Health & Environment
SOC	State Owned Company

DEFINITIONS

Word / Phrase	Definition
"WCL 1", "WCL 2" and "WCL 22"	Means the prescribed forms for reporting of incidents and occupational diseases referred to in the Compensation for Occupational Injuries and Diseases Act.
Competent Person	A person who has in respect of the work or task to be performed the required knowledge, training, experience and, where applicable, qualifications specific to that work or task: provided that where appropriate, qualifications and training are registered in terms of the provisions of the National Qualification Framework Act, (Act 67 of 2000).
Construction work	Any work in connection with: a) The construction, erection, alteration, renovation, repair, demolition or dismantling of or addition to a building or any similar structure b) the construction, maintenance, demolition or dismantling of any bridge, dam, canal, road, railway, runway, sewer or water reticulation system or any similar civil engineering structure; or the moving of earth, clearing of land, the making of an excavation, piling, or any similar type of work
Contractor (inclusive of Principal Contractor)	Any organization, person, entity performing activities for or on behalf of Johannesburg Water SOC Ltd.
Corrective Action	Action to eliminate the cause of a detected nonconformity or other undesirable situation.
Employee	Any person who is employed by or works for an employer and who receives or is entitled to receive any remuneration or who works under the direction or supervision of an employer or any other person
Employer	Any person who employs or provides work for any person and remunerates that person or expressly or tacitly undertakes to remunerate him, but excludes a labour broker as defined in section I (1) of the Labour Relations Act, 1956 (Act No. 28 of 1956)
Hazard	Means a source of or exposure to danger.
Hazard identification	The identification and documenting of existing or expected hazards to the health and safety of persons, which are normally associated with the type of construction work being executed or to be executed.
Incident	Means an incident as contemplated in section 24 (1) of the OHS Act 85 of 1993.
Machinery	means any article or combination of articles assembled, arranged or connected and which is used or intended to be used for converting any form of energy to performing work, or which is used or intended to be used, whether incidental thereto or not, for developing, receiving, storing, containing, confining, transforming, transmitting, transferring or controlling any form of energy
Mandatory	Includes an agent, a contractor or a subcontractor for work, but without derogating from his status in his own right as an employer or a user
Medical surveillance	Means a planned programme or periodic examination (which may include clinical examinations, biological monitoring or medical tests) of employees by an occupational health practitioner or, in prescribed cases, by an occupational medicine practitioner.
Method Statement	A document detailing the key activities to be performed in order to reduce as reasonably as practicable the hazards identified in any risk assessment.
Principal Contractor	Any employer who performs work and is appointed by the Client to be in overall control and management of the contract work (inclusive of Mandatories).
SHE File	A file or other record in permanent form, containing the information required as contemplated in the S.H.E Specification Document and legal requirements applicable to work activities.
SHE Plan	A documented plan which seeks to address all hazards identified means and ways to control and eliminate such to ensure compliance to the S.H.E Specification.
Workplace	Any physical location in which work related activities are performed under the control of the organization.

1. Introduction

In terms of Section 37 of the Occupational Health and Safety Act (Act no. 85 of 1993), Johannesburg Water SOC Ltd is required to control persons/organizations conducting activities for or on their behalf (Mandatories) and the Construction Regulations promulgated under the Occupational Health and Safety Act (Act no. 85 of 1993), is requiring Johannesburg Water SOC) Ltd. to compile an occupational health and safety specification for any intended project classified as construction work and to provide the specification to prospective tenderers / Mandatories.

The dual objective of this specification is to ensure that the Mandatories and Principal Contractors (herein after called Principal Contractor (including Mandatories)) entering into a contractual agreement/relationship with Johannesburg Water SOC Ltd. achieves and maintains an acceptable level of occupational health, safety and environmental performance whilst conducting activities to perform the contract work.

This document forms an integral part of the Contract Specification and, in particular, shall be the OCCUPATIONAL HEALTH, SAFETY AND ENVIRONMENTAL (SHE) SPECIFICATION FOR CONSTRUCTION WORK. The Contract Specification is contained in Volume 1 of the contract documents. The principal and other contractors shall ensure that this specification is included with any contract/s that they may have with other contractors and/or suppliers that are engaged for the provision of labour, goods or services for this project. The Principal Contractor and its Contractors shall furthermore implement any reasonable practicable means to ensure compliance to this Occupational Health, Safety and Environmental (SHE) Specification and any other applicable legislation on their organization and/or activities performed by or for them. This SHE Specification will be read in conjunction, where issued and applicable, with the Environmental Specification issued for listed activities requiring environmental authorization by a relevant authority.

Compliance with this SHE specification does not absolve the Principal Contractor from complying with any other applicable minimum legal requirement and the Principal Contractor remains responsible for the sustainable integrity of the environment and the health and safety of its employees, mandatories as well as any persons affected by activities conducted for or on behalf of Johannesburg Water SOC Ltd (SOC) Ltd..

1.1 Johannesburg Water SOC Ltd's commitment to Occupational Health &Safety (OHS) Management

Johannesburg Water SOC Ltd is committed to responsible occupational health & safety management. This commitment is essential to protect the environment, employees, Mandatories, visitors and provide a work environment conducive to health and safety. Principal Contractors and their Contractors shall demonstrate their commitment and concern by:

- Ensuring that decisions and practices affecting occupational health, safety and environmental performance are consistent with the issued OHS specification;
- Ensuring adequate resources are made available for the effective implementation of occupational health, safety and environmental control and mitigation measures;
- Participating in hazard identification and risk assessments and design safety reviews;
- Communicating occupational health, safety and environmental management processes, strategies and control measures with all levels of employees, contractor and/or visitors;
- Ensuring visible leadership at all sites;
- Promoting and enforcing the use of correct types of Personal Protective Equipment (PPE);
- Reporting and investigation of incidents and accidents and ensuring actions are identified and implemented to prevent similar types of incidents reoccurring;
- Participating in Client audits and meetings and ensuring required actions are implemented within reasonable time frames on the site/project;
- Recognizing and commending safe work practices and coaching employees who require guidance;
- Applying and enforcing consequence management from deviations and transgressions of/from compliance to this OHS Specification noted and/or observed, where applicable;
- Carrying out safety observations, implement corrective and preventative actions and giving immediate feedback;
- Encouraging employee participation in the formulation of work instructions and safety rules.

1.2 Scope of Occupational Health, Safety and Environmental (SHE) Specification

The scope of this Occupational Health & Safety (OHS) Specification is to address the reasonable and foreseeable aspects of occupational health, safety and environmental management, which will be affected by the contract work.

The specification will provide the requirements that the Principal Contractor and other Contractors shall comply with in order to reduce the risks associated with the contract work, and that may lead to incidents causing injury and/or ill health or degradation of the environment, to a level as low as reasonably practicable and possible.

In particular, Johannesburg Water SOC Ltd will ensure that it shall not appoint any Principal Contractor unless it is reasonably satisfied that the contractor which it intends to appoint has the necessary competencies and resources to carry out the work safely.

1.3 Omissions from OHS Specification

Where any omission from the OHS Specification is identified, applicable legal requirements will constitute the minimum standard for compliance to the relevant omission. The responsibility will be on the Principal Contractor to provide assurance to Johannesburg Water SOC Ltd on compliance to the applicable legal requirements related to the activity / task / process.

1.4 Change management

Whenever Johannesburg Water SOC Ltd identifies the need to change or review the SHE Specification, approved changes and revisions will be communicated to the Principal Contractor. A cost analysis on the implementation of the proposed changes / revisions will be calculated through a collaborative processes between Johannesburg Water SOC Ltd and the Principal Contractor – where the approved changes and/or revisions has no cost implication for the Principal Contractor the Principal Contractor will be required to accept the approved changes / revisions and ensure implementation within the SHE Plan / File framework.

2 Overview of contractor management process

The contractor management process consists of the following phases:

- Tender briefing and tender documentation;
- Competency evaluation of Principal Contractors (integrated into Supply Chain Management processes);
- Appointed contractor to attend OHS system induction;
- Preparation of OHS File by Principal Contractor;
- Evaluation of OHS File;
- Principal Contractor engagement phase;
- Project close-out and submission of consolidated Health & Safety File

2. SHE DOCUMENTATION

2.1 Safety file

The Principal Contractor will prepare a OHS File containing the processes / procedures and templates to be applied during the project period for the scope of work. The Principal Contractor will be evaluated during the contract period against the submitted OHS File.

Ata minimum the SHE File will contain the following documentation:

- Notification of construction work to the relevant Department of Labour (stamped on each page / no faxed copies);
- Scope of work to be performed;
- Personnel list (Principal Contractor employees);
- OH&S / SHE Policy and other Policies;
- Updated copy of the Occupational Health and Safety Act (Act no. 85 of 1993) and its Regulations; COID Act.
- Proof of valid registration and good standing with the Compensation Commissioner or another licensed Insurer;
- SHE Plan agreed with Johannesburg Water SOC Ltd.
- Approved risk assessments, review and monitoring plans and safe work procedures (method statements);
- A list of contractors (sub-contractors) including copies of the agreements between the parties and the type of work being done by each contractor;
- All written designations and appointments for project scope of work (CV and competency copies);
- Management structure (inclusive of OH&S responsibility & meeting structure);
- Induction training and site OHS rules;
- Occupational health and safety training matrix / plan;
- Arrangements with contractors and/or mandatories;
- Description of security measures;
- The following registers (as applicable to contract scope of work):
    - Accident and/or incident notifications, investigation & control register;
    - Occupational health and safety representatives inspection register;
    - Template for entry into confined space;
    - Toolbox talks pro-forma;
    - Fall protection inspections template;
    - First-aid box content template;
    - Record of first-aid treatment template;
    - Fire equipment inspection and maintenance template;
    - Ladder inspection template;
    - Machine safety inspections template (including machine guards, lock-outs etcetera);
    - Inspection templates for lifting machines and –tackle (including daily inspections by drivers/operators);
    - Inspection templates of scaffolding;
    - Inspections templates of structures;
    - Templates of issuing of Personal Protective Equipment;
    - Monthly reporting and recording of statistics templates;
    - Keeping of any other record in terms of applicable legislation falling within the scope of SHE Legislation applicable to the project and the Principal Contractor / Contractor's activities and organization.
- Emergency preparedness and response programmes;
- Medical examination tests
- Vaccination records

2.2 Principal contractor appointment

- The principal contractor will be appointed in terms of Construction Regulations 2014, Reg 5(1) k
- All responsibilities imposed on the contractor by the Regulations will be applicable

- The duties will include:
  a) Prepare a site specific SHE file based on client SHE specification and project scope.
  b) Have an updated Letter of Good standing.
  c) Ensure the necessary legal appointment letters are compiled and signed by affected parties.
  d) Ensure SHE file submitted before work commences to Johannesburg Water for evaluation and approval.
  e) Must ensure an organizational medical programme for its employees is in place. This must address pre-employment, periodic examination, and exit examinations.
  f) Ensure all employees undergo medical examination and are declared fit for the job they are employed for by a Medical Practitioner.
  g) All employees undergo his control undergo company specific induction and Johannesburg water induction.
  h) Ensure before work commences employees are trained on the health and safety risks associated with the work they are conducting.
  i) Ensure employees are trained on company procedures, policies, method statements and informed of the Johannesburg Water SHE requirements as per the specification.
  j) Ensure legislative requirements are complied with during the duration of the contract and ensure that their employees comply also.
  k) Sign the 37 (2) Agreement between Johannesburg Water and themselves before any work commences and kept on their SHE file.
  l) Ensure that 37(2) Agreement(s) are signed between themselves and their sub-contractors.
  m) Ensure that sub-contractors have valid Compensation Commissioner Letter of Good Standing.
  n) Have a disciplinary procedure to address those found to be transgressing requirements of SHE specification, SHE plan, site rules or any other OHS act and its Regulation requirement.
  o) Prevent any employee or visitor who is under the influence of any alcohol or drugs (in state of intoxication) from being allowed to site.
  p) Ensure the safety of employees who are taking legal medication.
  q) Must hand over a consolidated SHE file at the end of the contract.
  r) Stop his/her employees who are doing unsafe acts or who are creating an unsafe environment.
  s) Investigate all incidents and report to Johannesburg water and ensure all reportable incidents as per the legislative requirement are complied with.
  t) Ensure work is supervised by competent personnel and that work is done by competent employees.
  u) Ensure pre-task risk assessment is done by a competent person and that employees are informed of the pre-task risks and the risk control measures.
  v) Ensure tool box talks are conducted to communicate SHE issues in connection to the work being done and any other aspects.
  w) Ensue that appointed personnel as per the SHE file are executing their duties as per the legal appointment.
  x) Ensure first aid kit is made available in case of any emergency.
  y) Ensure that housekeeping is maintained in good condition and that materials are store/stacked properly is designated areas.
  z) Have sufficient waste receptacles and ensure the correct disposal of the different wastes.
  aa) Proof of hazardous waste disposal to be requested from disposal site and to be kept inside SHE file.
  bb) Take reasonable steps to ensure that each appointed sub-contractor health and safety plan is implemented and maintained on the site and SHE File documentation is up to date.
  cc) Stop any work from being executed which is not in accordance with the client's health and safety specification and the principal contractor's health and safety plan for the site or which poses a threat to the health and safety of persons.
  dd) Must maintain an up to date list of all the sub-contractors on site accountable to the principal contractor, the agreements between the parties and the type of work being done; and
  ee) Ensure that all his or her employees have a valid medical certificate of fitness.

2.3 37.2 Agreement

- Johannesburg Water will enter into a 37(2) Agreement with all the appointed contractors
- A copy of the 37(2) Agreement must be kept in the SHE file of the contractor at all times.

- It is the responsibility of the contractor to ensure that there are 37(2) agreements between themselves and all their appointed sub-contractors.

2.4 SHE Plan

- The contractor shall prepare a SHE plan to address and manage all applicable sources of risk that are identified during the execution of the project. The SHE plan shall incorporate the requirements as listed in the SHE specification.
- A copy of the SHE plan shall be submitted together with SHE file for review and approval.
- It is the contractor responsibility to ensure they sub-contractor compiles a SHE plan that in line with the SHE specification requirement of Johannesburg Water.

2.5 Legislative framework

All contractors shall comply with legislation pertaining to this contract, including but not limited to:

- Constitution of the Republic of South Africa
- Occupational Health and Safety Act and its associated Regulations
- National Environmental Management Framework Legislation
- National Road Traffic Act
- Applicable South African National Standards (SANS)
- Compensation of Occupational Injuries and Diseases Act (COID)
- Local by-laws and provincial ordinances

2.6 SHE Policy

A SHE policy is a statement of intent and a commitment by the organization Chief Executive or Managing Director (OHS Act 16(1) appointee) in relation to requirements applicable to their Safety, Health and Environmental legal obligation, relevant SHE roles and responsibilities, and contractual obligations to the Client.
The contractor and their sub-contractor companies shall each have a documented SHE Policy authorized by their Chief Executive/Managing Director (OHS Act Section 16 (1) Appointee). The SHE Policy must meet the following minimum requirements;

- Organizational Mission and Goal.
- State the overall SHE objectives within the project.
- Show commitment to the prevention of injuries and ill-health.
- Show commitment to the protection of environment and the conservation of natural resources.
- Must be reviewed at predetermined intervals, or when there is change in work process, serious incident occurs.
- The SHE Policy must be in line with OHSAS 18001 and ISO 14001 requirements and guidance documentation.
- Must be authorized by contractor CEO.

2.7 Appointments and competencies

- The contractor and its appointed sub-contractor must make the relevant legislative and non-statutory appointments, which must be maintained valid for the entire contract duration.
- All appointees shall be suitably trained and certified competent for the responsibilities they are assigned for.
- Copies of all relevant appointments and the relevant competence certificates must be kept in the relevant SHE file.

2.8 Supervision of construction work

- The principal contractor shall ensure that the construction manager and construction health and safety officer are appointed for a ***single site*** on a full time basis.
- JW should be informed in writing of the absence of the above-mentioned on site.

Appointment index

Appointment	Legislative Ref	Competency requirements (Min)
Confined Space Supervisor	GSR 5	Certificate + Proven experience
Construction Manager	CR 8.1	N.Dip Eng + 4yrs exp Full time on site
Construction Health, Safety Officer	CR 8.5 JW requirement	N.Dip Safety + 2yrs exp; OR N.Dip Enviro + 3yrs exp; OR NEBOSH / SAMTRAC + 4yrs exp Registered with SACPCMP as CHSO Full time on site
Construction supervisor	CR 8.7	3 yrs experience
Construction vehicle & mobile plant supervisor	CR 23.1	Certificate
Electrical installation and appliances inspector	CR 24	
Emergency, security and fire coordinator	CR 29	Certificate
Excavation supervisor (including piling)	CR 13	3yrs exp / N.Dip building
Fall protection supervisor	CR 10.1	Certificate
First-aiders	GSR 3	Certificate
Fire fighting equipment inspector	CR 29	Certificate
General Machinery Supervisor	GMR 2.1/7	GCC (GMR 2.1)/ 3yrs exp (GMR 2.7)
Temporary work supervisor (Formwork)	CR 12.2	N.Dip building + 4yrs exp
Hazardous chemical substances supervisor	HCS Regs	Certificate
Incident investigator	GAR 9.2	Certificate
Ladder inspector	GSR 13A	-
Lifting machines and equipment inspector	DMR 18.5	Certificate + 3yrs experience
Materials hoist inspector	CR 19.8	Certificate
Occupational health and safety committee	OHS Act 19	-
Occupational health and safety representatives	OHS Act 17	Certificate
Risk assessor	CR 9.1	Certificate
Stacking and storage supervisor	CR 28	Certificate
Structures supervisor	CR 11.2	N.Dip building + 4yrs exp
Suspended platform supervisor	CR 17.1	Certificate
Welding supervisor	GSR 9	Certificate

2.9 Insurances

- The principal contractor and all his appointed contractors shall be registered with an appropriate compensation commissioner and have available a valid letter of good standing at all times.
- The obligation lies with the contractor to ensure that the Letter of Good Standing remains valid throughout the entire duration of the project.

- A copy of the said letter must be filed in all SHE files and made available during inspections and audits.

2.10 Costing for SHE

The contractor is responsible for ensuring that SHE costing is taken into consideration for the entire project/contract as this will ensure they comply with the SHE legislative requirements.

2.11 Sub-contractors

- Whenever the Principal Contractor appoints contractors or sub-contractors, it is a requirement that an Occupational Health and Safety Act (Act no. 85 of 1993) Section 37(2) agreement (i.e. Agreement with Mandatory) is entered into between the Principal Contractor and Contractors.
- The Principal Contractor will ensure that all appointed contractors comply with the Johannesburg Water SOC Ltd SHE Specification requirements.
- The Principal Contractor will establish a procedure on sub-contractor management and assurance on compliance to the established procedure will be provided to Johannesburg Water SOC Ltd on a monthly basis.
- Principal Contractors are required to formally notify Johannesburg Water SOC Ltd before appointing subcontractors.
- Johannesburg Water SOC Ltd shall approve all specialist subcontractors to be appointed and/or engaged by the Principal Contractor.

The Principal Contractor shall:

- Ensure prior to work commencing on the site that every contractor is registered and in good standing with the compensation fund or with a licensed compensation insurer as contemplated in the Compensation for Occupational Injuries and Diseases Act, 1993;
- Appoint each contractor in writing for the part of the project on the construction site;
- Take reasonable steps to ensure that each contractor's health and safety plan is implemented and maintained on the construction site;
- Ensure that the periodic site audits and document verification are conducted at intervals mutually agreed upon between the principal contractor and any contractor, but at least once every 30 days;
- Stop any contractor from executing construction work which is not in accordance with the client's health and safety specifications and the principal contractor's health and safety plan for the site or which poses a threat to the health and safety of persons;
- Include and make available a comprehensive and updated list of all the contractors on site accountable to the principal contractor, the agreements between the parties and the type of work being done; and
- Ensure that all his or her employees have a valid medical certificate of fitness specific to the construction work to be performed and issued by an occupational health practitioner in the form of Annexure 3.

2.12 Notification of construction work

- The Principal Contractor shall, before carrying out any work, notify the relevant Department of Labour of the intention to carry out construction work and use the form (*Annexure 2 in the Construction Regulations 2014*) for this purpose.
- Only a certified copy stamped (each page) by the Department of Labour will be acceptable. No faxed or emailed notifications will be accepted.
- No work shall commence before the Principal Contractor has submitted notification of construction work to the relevant Department of Labour.
- Johannesburg Water SOC Ltd will not approve the SHE File if no original stamped / certified copy of the notification of construction work has been done.

2.13 Construction work permit

- There will be no requirement for a construction work permit for this project.

3. SAFE WORK PROCEDURES / METHOD STATEMENTS

Method statements or written safe work procedures shall be documented for all high risk activities:

- Design change or scope change/addition

- Change in job or task
- Introduction of new machinery, equipment or substance.

Method statements or written safe work procedures shall identify following:

- Tasks that are to be undertaken
- The hazards and associated risks of the task(s)
- The control measures for the task(s)
- The equipment and substances that are associated with task(s)
- Any training or qualification needed to do the task
- Personal protective equipment to be worn.

The following SOP / Method Statements should be included:

- Traffic Management Plan
- Drilling / connecting to the pipe
- PPE
- Incident Management
- Emergency Management
- Working inside excavations
- Shoring
- Operating Construction Vehicles & Mobile plant
- Welding / Hot works
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4. INCIDENT MANAGEMENT

7.1 Reporting of accidents and incidents

The Principal Contractor must report all incidents where an employee is injured on duty to the extent that he:

- Dies
- Becomes unconscious
- Loses a limb or part of a limb
- Is injured or becomes ill to such a degree that he is likely either to die or to suffer a permanent physical defect or likely to be unable for a period of at least 14 days either to work or continue with the activity for which he was usually employed

Or where -

- A major incident occurred
- The health or safety of any person was endangered
- Where a dangerous substance was spilled
- The uncontrolled release of any substance under pressure took place
- Machinery or any part of machinery fractured or failed resulting in flying, falling or uncontrolled moving objects
- Machinery ran out of control

to Johannesburg Water SOC Ltd within two days and to the Provincial Director of the Department of Labour within seven days from date of incident (Section 24 of the Occupational Health and Safety Act (Act no. 85 of 1993) and General Administrative Regulations), except that, where a person has died, has become unconscious for any reason or has lost a limb or part of a limb or may die or suffer a permanent physical defect, the incident must be reported to both Johannesburg Water SOC Ltd and the Provincial Director of the Department of Labour forthwith by telephone, telefax or e-mail.

- All other reports required by this specification must also be completed. Reporting of accidents / incidents to Johannesburg Water SOC Ltd will be on the prescribed format.
- The Principal Contractor is required to provide Johannesburg Water SOC Ltd with copies of all statutory reports required in terms of the Occupational Health and Safety Act (Act no. 85 of 1993) within 7 days of the incident occurring.

- The Principal Contractor is required to provide Johannesburg Water SOC Ltd with copies of all internal and external accident/incident investigation reports, within 7 days of the incident occurring.

7.2 Accident and incident investigation

- The Principal Contractor is responsible for the investigation of all accidents and/or incidents where employees and non-employees were injured to the extent that they had to receive medical treatment other than first aid.
- The results of the investigation are to be entered into the accident and/or incident register. The Principal Contractor is responsible for the investigation of all incidents, including those described in Section 24 (1) (b) and (c) of the Occupational Health and Safety Act (Act no. 85 of 1993) and for keeping a record of the results of the investigations including the steps taken to prevent similar accidents in future.
- The Principal Contractor is responsible for the investigation of all road traffic accidents, related to the construction activities, and for keeping a record of the results of the investigations including the steps taken to prevent similar accidents in future.
- Johannesburg Water SOC Ltd reserves the right to hold its own investigation into an incident or call for an independent external investigation.

7.3 Close out

- All incident investigation reports will be closed out once all the recommendations to prevent further incidents have been implemented.
- A copy of the investigation report must be handed to JW Safety Officer conducting the investigation.

5. MEDICAL SCREENING REQUIREMENTS

- The Principal Contractor shall ensure that a medical surveillance programme is implemented for all employees.
- An initial health evaluation shall be carried out by an occupational health practitioner immediately after a person commences employment, where any exposure exists or may exist, which comprises:
  - an evaluation of the employees medical and occupational history;
  - a physical examination; and
  - any other essential examination which in the opinion of the occupational health practitioner is desirable in order to enable the practitioner to do a proper evaluation.
- Medical surveillance and immunisation shall be done accredited at / by institutions or occupational health personnel, including, but not limited to:
  - Audiograms.
  - A cardio-respiratory examination / Lung function test;
  - Chest X-rays
  - Eye/ sight tests.
  - A general physical examination;
  - A review of previous medical history.
  - Glucose levels
  - Blood pressure

- An entry medical certificate shall be obtained for all workers prior to commencing with site activities from approved medical institution. Copies of all medical certificates shall be retained in the SHE File prior to site establishment and before an employee is allowed to come onto site.
- Specific attention shall be given to the physical and psychological fitness of people who will be required to work in elevated positions and operators of mobile machinery.
- An exit medical certificate shall be obtained for all workers at the end of the contract and for all workers who leave the employment of the Contractor before the end of the Project. Copies of all exit medical certificates shall be submitted to the Johannesburg Water SOC Ltd Project Specialist or Appointed OHS Agent.

9 EMERGENCY MANAGEMENT

The Principal Contractor must appoint a competent person to act as emergency controller and/or coordinator.

The Principal Contractor must conduct an emergency identification exercise and establish what emergencies could possibly develop. He must then develop detailed contingency plans and emergency procedures, taking into account any emergency plan that Johannesburg Water SOC Ltd may have in place.

In the event where a contractor incorporates the services of a 3rd party service provider for the provision of Emergency Response Services, the following criteria must be met:

- Identification of 3rd party emergency response services (organization & contact details);
- Notification of contractor to 3rd party emergency response service of incorporation of services into contractor's emergency response plan (written agreement / signed letter).

The Principal Contractor and the other contractors must hold regular practice drills of contingency plans and emergency procedures to test them and familiarise employees with them.

First-aid

The Principal Contractor must provide first-aid equipment (including a stretcher) and have qualified first-aider(s) on site as required by General Safety Regulations promulgated in terms of the Occupational Health and Safety Act (Act no. 85 of 1993).

The contingency plan of the Principal Contractor must include arrangements for the speedy and timeous transporting of injured and/or ill person(s) to a medical facility or of getting emergency medical aid to person(s) who may require it.

The Principal Contractor must have written arrangements in place with his other contractors regarding the responsibility of the other contractors towards their own injured and/or ill employees.

10 SHE TRAINING

- All operators, drivers and users of construction vehicles, mobile plant and other equipment are to be in possession of valid proof of training and, where applicable, valid licenses.
- All employees should receive general induction prior to starting work.
- Toolbox talks should be conducted daily.

10.4 Site-specific induction training

The Principal Contractor will be required to develop a project specific induction-training course based on the baseline risk assessment for the contract work. He will ensure that all his employees and other contractors and their employees have received training on the submitted induction-training programme.

All employees of the principal and other contractors are to be in possession of proof (on person) that they have attended a site-specific occupational health and safety induction-training course.

No contractor shall allow or permit any employee, visitor or any other person to enter the site, unless such employee or person has undergone health, safety and environmental induction training pertaining to the hazards prevalent on the site at the time of entry.

Where the Principal Contractor is required to operate within Johannesburg Water SOC Ltd Depot's the Principal Contractor will ensure that all employees undergo the Johannesburg Water SOC Ltd induction.

11 PPE REQUIREMENTS

- The Principal Contractor is required to continuously identify the hazards in the workplace and deal with them. He must either remove them or, where impracticable take steps to protect workers and make it possible for them to work safely and without risk to health under the hazardous conditions.
- The Principal Contractor will establish a Personal Protective Equipment Policy and a Personal Protective Equipment study will be conducted to determine the types of Personal Protective Equipment (PPE) to be supplied related to the hazards and risks emanating from the tasks.
- Cognisance shall be given to the gender of individuals required to where PPE; size required by the employee and size issued.
- Personal protective equipment should, however, be the last resort and there should always first be an attempt to apply engineering and other solutions to mitigating hazardous situations before the issuing of personal protective equipment is considered.
- Where it is not possible to create an absolutely safe and healthy workplace the Principal Contractor is required to inform employees regarding this and issue, free of charge, suitable equipment to protect them from any hazards being present and that allows them to work safely and without risk to health in the hazardous environment.
- It is a further requirement that the Principal Contractor maintains the equipment, instructs and trains the employees in the use of the equipment and ensures that the employees use the prescribed equipment.
- Employees do not have the right to refuse to use and/or wear the equipment prescribed by the employer and, if it is impossible for an employee to use or wear the prescribed protective equipment through health or any other reason, the employee cannot be allowed to continue working under the hazardous condition(s) for which the equipment was prescribed. An alternative solution has to be found that may include relocating the employee.
- The Principal Contractor may not charge any fee for protective equipment prescribed by him but may charge for equipment under the following conditions:
    - Where the employee requests additional issue in excess of what is prescribed;
    - Where the employee has patently abused or neglected the equipment leading to early failure; and
    - Where the employee has lost the equipment.

All employees shall, as a minimum, be required to wear the following personal protective equipment on any of Johannesburg Water SOC Ltd's projects:

- Protective overalls;
- Protective footwear;
- Protective headwear; and
- Eye, face and ear protection.
- NO SHORTS OR DRESSES WILL BE ALLOWED ON SITE!!!

All Personal Protective Equipment will clearly display the branding components of the Principal Contractor's organization (e.g. Name of Organization, logo).

12 DISCIPLINARY PROCESSES

- The contractor is required to implement disciplinary process in order to enforce compliance with requirements.
- All sub-contractors are required to have the same.

13 SITE RULES

- The Principal Contractor must develop a set of site-specific OH&S rules that will be applied to regulate the Health and Safety Plan and associated aspects of the construction.
- When required for a site by law, visitors and non-employees upon entering the site shall be issued with the proper Personal Protective Equipment (PPE) as and when necessary.

Alcohol, Drugs and Other Intoxicating Substances

- The contractor shall ensure that all personnel under his authority do not at any time enter the site or perform any work whilst under the influence of alcohol, a drug, or any other intoxicating substance.
- Selling or possessing drugs, alcoholic beverages or any other intoxicating substance on the site is strictly prohibited.
- A drugs and alcohol testing program must be implemented. Persons entering the site must be randomly tested.
- Any person who tests positive for alcohol or drug consumption must be subject to disciplinary action and be dealt with in accordance with the contractor's drug and alcohol / substance abuse policy.
- Should the actions and / or demeanour of an employee suggest possible narcosis or drunkenness, the employee must be removed from the site. This may be done without testing. Note: All personnel involved in an incident / accident must immediately be subjected to an alcohol test and a drug test as part of the investigation.

Firearms, Ammunition and Offensive Weapons Firearms, ammunition, and offensive weapons of any kind are strictly prohibited. No person shall be permitted to enter the site carrying any such item

14 PUBLIC HEALTH AND SAFETY

The Principal Contractor is responsible for ensuring that non-employees affected by the construction work are made aware of the dangers likely to arise from the construction work as well as the precautionary measures to be observed to avoid or minimise those dangers. This includes:

- Non- employees entering the site for whatever reason;
- The surrounding community; and
- Passers-by the site.

- The Principal Contractor shall organize the site in such a manner that pedestrians and vehicles can move safely and without risks to health, including sufficient and suitable traffic routes and safe walkways with relevant signage.
- Appropriate signage must be posted to this effect and all employees on site must be instructed to ensure that non-employees are protected at all times.
- All non-employees entering the site must receive induction into the hazards and risks of the site and the control measures to be observed.
- The Principal Contractor shall recognize that the Community Liaison Officer (CLO) is the link between Johannesburg Water SOC Ltd and the community and provide all reasonable support to the Community Liaison Officer to ensure relevant responsibilities are fulfilled and positive relationships with the community are maintained.
- Where activities are performed close to public routes, the Principal Contractor will establish a traffic management plan incorporating the requirements of relevant by-laws. At a minimum, barricading, warning signage and flagmen will be provided to ensure the protection of workers from vehicles in transit. Where required, the Principal Contractor will interact with the local traffic department to establish minimum requirements to be implemented on public routes.

15 REFUSAL TO WORK

- Section 14 of the OHS Act states that employees shall carry out any lawful orders given to them, suggesting that they have the right to refuse to obey any unlawful order or work instruction.
- In terms of legal and JW requirements, if an employee has reasonable belief that the work to be carried out is likely to endanger themselves or other persons in any way, he/she has the right to refuse to work.

- An employee may also refuse to work in term of Section 29 of NEMA, if the work would result in imminent and serious threat to the environment.
- All contractors shall ensure that their employees are conversant with hazards associated with their work and work environment, and be aware of the precautionary measures to take.
- The contractor must ensure that all refusals to work are investigated promptly and resolved timeously.

16 SECURITY

The Principal Contractor must establish site access rules and implement and maintain these throughout the construction period. Access control must, amongst other, include the rule that non-employees will not be allowed on site unaccompanied.

The Principal Contractor must develop a set of security rules and procedures and maintain these throughout the construction period.

The Principal Contractor shall:

- Provide a guardhouse for security personnel. The guardhouse should be in good condition and at-least meet minimum requirements as per Environmental Regulations for Workplaces as promulgated under the Occupational Health and Safety Act (Act no. 85 of 1993).
- Supply an access card containing the name, surname, employee number and photograph for all appointed employees (full or part time) for the site.
- Ensure that no person enters the construction site without wearing the necessary Personal Protective Equipment (PPE).
- Ensure that no children are allowed on the construction site.
- Ensure that no family members are sleeping over on the construction site.
- Ensure that no pets are allowed on the construction site.
- No firearms are allowed on site.

Visitors

- Visitors (including reps and suppliers) must be advised in advance of the mandatory Personal Protective Equipment (PPE) requirements for the site, and must arrive with all of this PPE.
- All visitors must sign in the visitors register and undergo a visitor induction briefing before entering the site.
- A visitor access card must be issued to each visitor on conclusion of the induction briefing. Whilst on site, visitors must be accompanied at all times by an appropriately senior employee who has been inducted fully.
- When leaving the site, each visitor must return his or her visitor access card to the security personnel posted at the entrance / exit.
- A visitor will not be permitted to leave the site until he or she produces the access card that was issued.
- Any request (typically made by a government official) to carry out a site inspection must be referred to the Project Manager / Engineer / Safety Agent.
- The contractor must not arrange any such inspection without prior approval from the Client's representatives.

17 ACCOMMODATION ON SITE

No employees shall be accommodated on site.

18 WELFARE FACILITIES

The provision of toilets for each sex is required in terms of the National Building Regulations and Construction Regulation 28. Chemical toilets are allowed instead of the water borne sewerage type. Toilets have to be provided at a ratio of 1 toilet per 30 workers. The Principal Contractor shall provide flushing toilets on the construction premises.

- At least cold-water showers for each sex have to be provided at a ratio of 1 shower per 15 workers.
- Some form of screened off changing facility must be provided separately for each sex.
- Some form of eating facility sheltered from the sun, wind and rain must be provided.

The employer needs to provide his employees with the following:

- Potable water for drinking;
- Water and soap for hand washing
- Toilet paper

19 COMPLIANCE MONITORING

19.1 Inspections

- Contractors will be inspected at least once per week by the JW Project Inspectors.
- Feedback of the inspections will be issued immediately on work instructions, and a formal report sent within 7 days of conducting the inspection to all relevant stakeholders.
- Johannesburg Water SOC Ltd. reserves the right to conduct other ad-hoc assessments and inspections as deemed necessary.
- This may include, amongst other measures, site safety walks. Corrective actions will be identified by Johannesburg Water SOC Ltd. and the Principal Contractor's representative and implemented by the Principal Contractor (at no cost to Johannesburg Water SOC Ltd.) to ensure SHE Performance improvement.

19.2 Monthly audits

- Monthly audits will be conducted within periods not exceeding 30 days.
- The Principal Contractor is to conduct his own monthly internal audits and inspections to verify compliance with his own occupational health and safety plan and management system as well as compliance with the requirements of the Johannesburg Water SOC Ltd. SHE Specification.
- The Principal Contractor will also assess and inspect the compliance of other contractors under its control. Management members of the Principal Contractor will be involved in the internal assessments and inspections.

19.3 Monthly compliance rating

A monthly compliance rating will be calculated for each Principal Contractor as per a formula determined by Johannesburg Water SOC Ltd focussing on or incorporating outcomes of assurance (e.g. monthly audit), operational (e.g. behavioural based safety inspection) assessments and other requirements, as necessary. Johannesburg Water SOC Ltd reserves the right to adjust the monthly compliance calculation formula as and when required – each revision of the monthly compliance calculation formula will be communicated to the Principal Contractor before implementation.

Each Principal Contractor is required to maintain a minimum compliance rating of 93% (Ninety Three Percent).

Scoring	Classification	Classification description
93% -100%	Good	Substantial compliance

80% -92%	Average	Compliance status needs to be improved
60% - 79%	Poor	Methods to ensure compliance require substantial improvement - operations with substantial non-compliance risks
<60%	Very poor	Methods to ensure compliance failed completely - troubled operation with severe non-compliance risks

19.4 Work stoppages

Work stoppages will be identified for 2 (two) types of work stoppages to be implemented:

- Overall work stoppage – the Principal Contractor and its Contractors are not allowed to continue with any type of construction / site work up until the work stoppage has been closed-out;
- Activity work stoppage – The Principal Contractor and its Contractors are not allowed to continue with the specific activity / task / job up until the work stoppage has been closed-out.

Overall work stoppages will be issued where non-conformances are identified against the criteria in the following table.

NO.	DESCRIPTION OF AUDIT NON-CONFORMANCE / NON-COMPLIANCE
1	**NOTIFICATION OF CONSTRUCTION WORK**
1.1	Local Department of Labour not notified of construction work before commencement of construction activities
1.2	Notification of construction work not stamped by local Department of Labour (no fax copies)
1.3	Copy of notification of construction work not available on site
2	**PROOF OF REGISTRATION WITH COMPENSATION COMMISSIONER**
2.1	Proof of registration with Compensation Commissioner or other insurer not available
2.2	Registration with Compensation Commissioner or other insurer not valid and up-to-date
3	**POLICY COMMITMENT & SHE SPECIFICATION**
3.1	SHE Plan not compiled, approved by contractor management and available on site
4	**SECTION 37(2) AGREEMENT**
4.1	Signed section 37(2) Agreement not signed and available on site
5	**RISK ASSESSMENTS**
5.1	Risk assessments not developed/ not applicable to scope of work issued by Client
6	**CONSTRUCTION MANAGER**
6.1	No construction manager appointed / on site / Construction Manager not full time on site
6.2	Appointed construction manager does not meet requirements
7	**SITE SAFETY OFFICER**
7.1	No safety officer appointed/ available on site
7.2	Safety officer does not meet requirements
8	**SHE FILE**

NO.	DESCRIPTION OF AUDIT NON-CONFORMANCE / NON-COMPLIANCE
8.1	No file on site

Activity work stoppages will be issued where non-conformance are identified per activity where the health and safety of employees or the public is compromised.

20.4 Non-compliance management process

The following actions will be instituted where non-conformances are identified in terms of compliance to relevant legislative requirements and the Johannesburg Water SOC Ltd SHE Specification.

20 OPERATIONAL REQUIREMENTS

20.1 EXCAVATIONS

- Where excavations will exceed 1.5 m in depth the contractor will be required to submit a method statement to Johannesburg Water SOC Ltd for approval before commencing with the excavation and Johannesburg Water SOC Ltd will issue a permit to proceed once the risk assessment and method statement is approved.
- Excavations must be limited to 100m per day, or equated to the amount of work to be done for the day.
- All open excavations shall be closed within 3 days of excavation. No excavation will remain open beyond 3 days or during holidays.
- Excavation work must be carried out under the supervision of a competent person, who has been appointed in writing, with at least two years' experience in excavation work. Before excavation work begins the stability of the ground must be evaluated.
- Whilst excavation work is being performed, the contractor must take suitable and sufficient steps to prevent any person from being buried or trapped by a fall or dislodgement of material.
- No person may be required or permitted to work in an excavation that has not been adequately shored or braced.
- Where the excavation is in stable material and where the sides of the excavation are sloped back to at least the angle of repose of the excavated material, shoring or bracing may be left out but only after written permission has been obtained from the appointed competent person.
- Shoring and bracing must be designed and constructed to safely support the sides of the excavation.
- Where uncertainty exists regarding the stability of the soil the opinion of a competent professional engineer or professional technologist must be obtained whose opinion will be decisive. The opinion must be in writing and signed by the engineer or technologist as well as the appointed competent person.
- No load or material may be placed near the edge of an excavation unless suitable shoring has been installed to be able to carry the additional load.
- Neighbouring/adjoining buildings, structures or roads that may be affected or endangered by the excavation must be suitably protected.
- Every excavation must be provided with means of access that must be within 6 metres of any worker within the excavation.
- The location and nature of any existing services such as water, electricity, gas etc. must be established before any excavation is commenced with and any service that may be affected by the excavation must be protected and made safe for workers in the excavation.
- The appointed competent person must inspect every excavation, including the shoring and bracing or any other method to prevent collapse, as follows:
    - Daily before work commences
    - After every blasting operation

  - After an unexpected collapse of the excavation
  - After substantial damage to any supports
  - After rain
- The results of any inspections must be recorded in a register kept on site and in the safety file.
- Every excavation accessible to the public or that is adjacent to a public road or thoroughfare or that threatens the safety of persons, must be adequately barricaded or fenced to at least one meter high and as close to the excavation as practicable, regardless of the depth of the excavation.
- Every excavation must be provided with warning lights or visible boundary indicators after dark or when visibility is poor.
- Upon entering an excavation the requirements of General Safety Regulation 5, work in confined spaces, must be observed:
- Any confined space may only be entered after the air quality has been tested to ensure that it is safe to breathe and does not contain any flammable or noxious air mixture.
- The confined space must be purged and ventilated of any hazardous or flammable gas, vapour, dust or fumes.
- The safe atmosphere must be maintained and, where necessary.
- Employees are to be provided with breathing apparatus and must wear a safety harness with a rope with the free end of the rope being continuously attended to by a person outside the confined space.
- Furthermore, an additional person, trained in resuscitation, to be in full-time attendance immediately outside the confined space.
- Additional serviceable breathing and rescue apparatus is kept immediately outside the confined space for rescue purposes.
- All pipes, ducts etc. that may leak into the confined space to be blanked off sufficiently to prevent any leakage or seepage.
- The employer must ensure that all employees have left the confined space after the completion of work.
- Where flammable gas is present in a confined space no work may be performed in close proximity to the flammable atmosphere.
- Excavations and other openings must be provided with sufficient barriers to prevent construction vehicles and mobile plant from falling into them.
- Excavations left open for extended periods of time (exceeding 48 hours) must be approved the relevant Engineer / Construction Supervisor.

20.2 EXISTING SERVICES

- The Contractor shall note that although the drawings have been prepared using available information they show only the approximate positions of existing services where applicable.
- The information is supplied in good faith but shall be used as a guide only and does not relieve the Contractor of his responsibility to exercise due caution when working in areas where existing services can reasonably be expected, nor his obligation to liaise with the authorities in this regard and the obtaining of the necessary work permits and wayleaves.
- The Contractor shall be responsible to locate and safeguard any existing service he may encounter during construction. The Contractor shall be responsible for any damage to such existing services and works in the execution of this contract and shall reimburse the Employer, authority or the owner concerned for any repairs required following damages due to the Contractor's negligence.
- The Contractor shall be responsible for immediately notifying the Engineer and the authorities concerned regarding any damage caused to public services and existing works.
- Any alterations to public services shall be carried out by the Authority concerned unless the Contractor is instructed otherwise.

20.3 SETTING OUT OF WORKS

- Reference and level beacons will be shown to the Contractor by the Engineer at the commencement of the Contract and the Contractor will be responsible for transferring the datum to the Site of Works.
- The Contractor shall check the condition and accuracy of all reference and level beacons and satisfy himself that they have not been disturbed and are true with regard to position and level. A beacon that has been disturbed shall not be used until its true position and level have been re-established and the new values have been certified by the Engineer. The Contractor shall thereafter be held entirely responsible for the protection of all reference and level beacons.
- The Contractor shall employ a capable surveyor to set out the Works to the required lines and levels. The Engineer shall be informed immediately should any discrepancy be discovered between the levels or dimensions obtained by the Contractor and those shown on the drawings.
- Where a beacon is likely to be disturbed during construction operations, the Contractor shall establish suitable reference beacons at locations where they will not be disturbed during construction. No beacons shall be covered over, disturbed or destroyed before accurate reference beacons have been established and details of the positions and levels of such beacons have been submitted to the Engineer. The Contractor's reference beacons shall be of at least the same accuracy and sturdiness of construction as the existing beacons.
- The Contractor shall submit the method of setting out he proposes to employ to the Engineer. Accurate control of line and level shall be provided by the Contractor at all stages of construction.
- Work set out by the Contractor may be checked by the Engineer and any errors found shall be rectified by the Contractor at his own expense. The Contractor shall supply any instrument, equipment, material and labour required by the Engineer for this survey work. Any assistance, including checking given to the Contractor by the Engineer or any setting out done by the Engineer for Contractor shall not be held as relieving the Contractor of his responsibility for the accurate construction of the Works.
- The Contractor's survey instruments and survey equipment shall be suitable for the accurate setting out of the Works and shall be subject to the approval of the Engineer. They shall furthermore be checked and correctly adjusted by the authorized agents before the commencement of the contract and subsequently when required by the Engineer and when otherwise necessary.

Survey work shall not be measured and paid for directly and compensation for the work involved in setting out shall be deemed to be covered by the rates tendered and paid for the various items of work included under the contract.

20.4 CONFINED SPACE ENTRY

- Enclosed space work necessitates a Confined Space Permit. This may only be obtained from the authorized person nominated in writing.
- The responsibility for safe procedure, both at the time of entry and during the entire operation of entering and working in confined spaces, rests with the Contractor.
- The Contractor shall be sure that adequate steps have been taken to eliminate or control hazards.
- Before working in an area that contains dust, the area is to be ventilated and hosed down to settle and dampen the dust.
- The Contractor shall provide all necessary equipment to manage confined spaces, including all necessary monitoring and rescue equipment (such as tripods, breathing equipment and the like).
- The Contractor shall ensure all persons working in a confined space or managing entry to a confined space are appropriately trained.
- Compulsory - Continuous monitoring, trained rescue teams, radio communication & adequate ventilation.

20.5 BARRICADING

- The Contractor shall erect the necessary signs, notices and barricades for the duration of the contract in order to safeguard both the Works and the public.
- Where areas are unsafe, they should be enclosed with barricading. Examples are people working overhead, welding splatter etc.
- Where there is a risk of injury, the area should be barricaded off with secure solid barricades.
- Barricading for the prevention of access into areas with a potential risk of injury shall as a minimum be constructed of a handrail, knee-rail and appropriately supported as to prevent any person from falling into the restricted/risk area.
- Appropriate signage shall be affixed to the barricade indicating the risk associated (i.e. deep excavation, lifting operations etc.) and the responsible Supervisor and contact details shall be displayed. All barricading shall have a "No Entry" signs on all sides and at each change of direction. Signage shall be placed at 20 m intervals where lengths exceed. All signage shall be a minimum size of 290 mm x 290 mm.
- Danger tape shall not be utilised to prevent personnel from entering into areas.
- Where no risk exists of injury to personnel such as stacking and storage areas, the use of wire for hand and knee rails netting shall be acceptable to demarcate the area.
- All barricades will have a dedicated entrance where it is required that personnel enter the areas.
- Appropriate signage shall be placed at the entrance indicating which Contractor has right of entry.
- It is the Contractor's responsibility to remove all redundant barricades directly after use. The Contractor's Safety Officers will maintain a marked-up site plan indicating where barricades are erected.
- It will be a requirement that the contractor protects employees against contact with exposed rebar and poles by the installation of rebar-caps on all exposed areas where there is a potential that an employee could be injured.

20.6 SYMBOLIC SIGNGAGE

Contractors shall use mandatory and prescribed symbolic safety signs at their lay down and site areas. The display of the following signs is mandatory: the following signs should be made available:

- "Radio-Active Material" symbolic signs at radioactive storage areas.
- "Eye Protection" symbolic signs shall be displayed at all grinding machines and at any area where it is mandatory to wear eye protection or where there is danger of an eye injury being sustained.
- "Ear Protection" symbolic signs shall be displayed at all areas where there is a danger of noise induced hearing loss being sustained.
- Every separate room of a workplace shall be consecutively numbered.
- All toilets or urinals shall be marked in a conspicuous place with painted or stencilled letters to indicate the sex for which they are intended.
- The location of every first aid box is to be clearly indicated by means of a sign.
- In any room, cabinet or enclosure where flammable substances are used or stored shall be fixed a suitable and conspicuous sign prohibiting smoking or the use of naked flames in the area.
- At the entrance to premises where machinery is used
- Restricted access on "Authorised Person Only" signs on entry. "No person shall enter the workplace or premises without the permission of the employer or user of the machinery".
- At every place where machinery is used a notice (English & Pictograms) shall be posted.
- Explosive Power Tool shall have a sign warning people when it is in use.
- Electrical Control Gear. A notice shall be posted so as to warn against the re-closing of a switch of control gear whilst a person is working on such equipment.
- Emergency contact telephone numbers.
- Adequate scaffolding signs. (When applicable).
- Adequate fire fighting equipment signs.
- Speed limit signs.
- Warning notices at openings through which people may fall.

- Risk based signage depending on the task being performed e.g.:
    - "Men working above", "Men working below', "Road closed – detour", "Excavation in progress", "No walkway" etc.;
- No-entry signs to incomplete platforms

20.7 USE AND STORAGE OF FLAMMABLES

The Principal Contractor to ensure that:

- No person is required or permitted to work in a place where there is the danger of fire or an explosion due to flammable vapours being present unless adequate precautions are taken;
- No flammable material is used or applied e.g. in spray painting, unless in a room or cabinet or other enclosure specially designed and constructed for the purpose unless there is no danger of fire or explosion due to the application of adequate ventilation;
- The workplace is effectively ventilated. Where this cannot be achieved:
    - Employees must wear suitable respiratory equipment
    - No smoking or other source of ignition is allowed in the area
    - The area is conspicuously demarcated as "flammable"
- Flammables stored on a construction site are stored in a well-ventilated, reasonably fire-resistant container, cage or room that is kept locked with access control measures in place. Sufficient fire fighting equipment is installed and fire prevention methods practiced. Proper housekeeping may achieve this;
- Flammables stored in a permanent flammable store are stored so that no fire or explosion is caused.
- Stored in a locked and well-ventilated reasonably fire resistant container, cage or room conspicuously demarcated as "Flammable Store – No Smoking or Naked Lights"
- The flammables store to be constructed of two-hour fire retardant walls and roof and separated from adjoining rooms or workplaces by means of a two-hour fire retardant fire wall
- Adequate and suitable fire fighting equipment installed around the flammables store and marked with the prescribed signs
- All electrical switches and fittings to be of a flameproof design
- Any work done with tools in a flammable store or work areas to be of a non-sparking nature
- No Class A combustibles such as paper, cardboard, wood, plastic, straw and the like to be stored together with flammables
- The flammable store to be designed and constructed such that in the event of spillage of liquids the store is able to contain the full quantity + 10% of the liquids stored
- A sign indicating the capacity of the store to be displayed on the door
- Only one day's quantity of flammable is to be kept in the workplace;
- Containers (including empty containers) to be kept closed to prevent fumes/vapours from escaping and accumulating in low lying areas;
- Metal containers to be bonded to earth whilst decanting to prevent build-up of static forces; and
- Welding and other flammable gases to be stored segregated according to the type of gas and empty and full cylinders.

20.8 FIRE PREVENTION AND PROTECTION

The Principal Contractor must ensure that:

- The risk of fire is avoided;
- Sufficient and suitable storage for flammables is provided;
- Sources of ignition are removed wherever flammable or highly combustible material is present in the workplace, for example:
    - Notices prohibiting smoking are displayed and enforced
    - Welding and flame cutting is only allowed under controlled conditions that includes written hot work permits
    - Only spark-free hand and power tools are used

  - No grinding, cutting and shaping of ferrous metals is allowed using electrically driven power tools that produce sparks
  - Flameproof switches and fittings are to be used in the flammable atmosphere
  - Good housekeeping is maintained to prevent the accumulation of unnecessary combustibles
  - Adequate ventilation is maintained
  - Adequate and suitable fixed and portable fire fighting equipment is provided and maintained in good working order.
- Maintenance must include:
  - Regular inspection of fire equipment by a competent person appointed in writing and keeping a register
  - Annual inspection and service by an accredited service provider
- All employees are instructed in the use of the fire fighting equipment and know how to attempt to extinguish a fire;
- A sufficient number of employees are appointed and trained to act as an emergency team to deal with fires and other emergencies;
- Employees are informed regarding emergency evacuation procedures and escape routes;
- Emergency escape routes are kept clear at all times and clearly marked;
- Evacuation assembly points are demarcated;
- Evacuation is practiced to ensure that all persons are evacuated timeously;
- Roll call is held after evacuation to account for all personnel and ensure that no-one has been left behind; and
- A siren or alarm is fitted which is clearly audible to all persons on site.

20.9 HOUSEKEEPING

The Principal Contractor to ensure that:

- Housekeeping is continuously implemented and maintained;
- Materials and equipment are properly stored;
- Scrap, waste and debris is removed regularly;
- Materials placed for use are placed safely and not allowed to accumulate or cause obstruction to the free-flow of pedestrians and vehicular traffic;
- Waste and debris not to be removed from heights by throwing but rather by chute or crane;
- Where practicable, construction sites are fenced off to prevent entry of unauthorised persons;
- Catch platforms or nets are erected over entry and exit ways or over places where persons are working to prevent them being struck by falling objects;
- An unimpeded work space is maintained for every employee;
- Every workplace is kept clean, orderly and free of tools, materials and the like that are not required for the work being done;
- As far as is practicable, every floor, walkway, stair, passage and gangway is kept in good state of repair, skid-free and free of obstruction, waste and materials;
- The walls and roof of every indoors workplace sound and leak-free; and
- Openings in floors, hatchways, stairways and open sides of floors or buildings are barricaded, fenced, boarded over or provided with protection to prevent persons from falling.

20.10 PUBLIC SAFETY & TRAFFIC MANAGEMENT

The Principal Contractor is responsible for ensuring that non-employees affected by the construction work are made aware of the dangers likely to arise from the construction work as well as the precautionary measures to be observed to avoid or minimise those dangers. This includes:

- Non- employees entering the site for whatever reason;
- The surrounding community; and
- Passers-by the site.

- The Principal Contractor shall organize the site in such a manner that pedestrians and vehicles can move safely and without risks to health, including sufficient and suitable traffic routes and safe walkways with relevant signage.
- Appropriate signage must be posted to this effect and all employees on site must be instructed to ensure that non-employees are protected at all times.
- All non-employees entering the site must receive induction into the hazards and risks of the site and the control measures to be observed.
- The Stakeholder Relations Specialist will be the link between Johannesburg Water SOC Ltd and the community to ensure relevant responsibilities are fulfilled and positive relationships with the community are maintained.
- Where activities are performed close to public routes, the Principal Contractor will establish a traffic management plan incorporating the requirements of relevant by-laws. At a minimum, barricading, warning signage and flagmen will be provided to ensure the protection of workers from vehicles in transit. Where required, the Principal Contractor will interact with the local traffic department to establish minimum requirements to be implemented on public routes.
- Where roads will be closed proper signage including the following will be posted:
    - Road closed
    - Detour
    - Keep left / right
    - Slow down
    - Deep excavation
    - Delineator
    - Road work ahead

20.11 HAND TOOLS

The Principal Contractor must inspect all hand tools before it is brought onto the site.

- As far as possible all hand tools must be numbered and placed on register to be inspected monthly by a person designated to do so.
- Any tools found to be in an unsafe condition must immediately be removed from service and either discarded or rectified.
- No chisels with “mushroomed” heads must be used.
- No hammer shall be used with a cracked or damaged handle.
- All files must be fitted with handles.
- All trolleys, pushcarts, etc. used on site must be identifiable, placed on register and inspected at least once every month.
- Non-sparking tools must be used in areas where the risk of fire or explosion is present.
- No homemade hand tools are allowed on the project.
- All tools shall be attached to a suitable lanyard when utilised in elevated positions

20.12 PORTABLE ELECTRICAL EQUIPMENT

Portable electrical tools and equipment includes every unit that takes electrical power from a 15 ampere plug point and is moved around for use in the workplace for example; drills, saws, grindstones, portable lights, etcetera. Other electrical appliances such as fridges, hotplates, heaters, and etcetera must be inspected and maintained to the same standards as portable electrical tools and appliances.

The use, inspection and maintenance of portable electrical tools and equipment shall be as follows:

- Periodical inspections must be carried out by a competent person appointed in writing;
- Inspection results must be recorded in a register;
- Only competent authorised persons are allowed to use portable electrical tools and equipment; and
- The correct protective equipment must be worn or used whilst operating portable electrical tools and equipment.

This equipment:

- Must be maintained in good condition at all times to prevent an electrical shock to the user;
- The main power source should incorporate an earth leakage protection device or receive power through a double wound transformer or be double insulated and clearly marked as such; and
- All equipment must be fitted with a switch to allow for safe and easy starting and stopping.

The following requirements apply to portable lights:

- Must be fitted with a robust non-hygroscopic non-conducting handle;
- Live metal parts or parts which may become live must be protected against contact;
- The lamp must be protected by a strong guard;
- The cable lead-in must withstand rough handling;
- Inspections must be undertaken that concentrate on plug, cord, switch and any obvious faults;
- A register be kept for each piece of equipment with findings of regular inspections undertaken to evaluate the condition of these lights; and
- When used in wet/damp/metal container conditions, the lamp must be protected.

20.13 LADDERS

The following requirements for ladders will apply:

- All ladders used on the site shall be constructed and used in compliance with the OH&S Act and Regulations.
- Ladders, which provide access to a working platform, shall extend one metre above the platform where it provides access, and shall be secured to prevent slipping.
- Timber ladders shall not be painted other than with clear preserving oils, clear varnishes or clear plastics.
- Ladders, which are in a damaged condition, shall not be used and shall be labelled accordingly and removed from the Premises.
- All Ladders shall be numbered, logged in a register, and inspected monthly.
- A ladder in use shall be held by an assistant and/or properly tied down in position.
- Only ladders that do not conduct electricity shall be used in live electrical sub-stations and switching rooms.
- Ladders shall be removed after use and stored in an appropriate facility as to not expose them unnecessarily to the elements or potential damage by surrounding activities.

20.14 CONSTRUCTION VEHICLES AND MOBILE PLANT

Johannesburg Water SOC Ltd will inspect construction vehicles and mobile plant prior to being allowed on a project site. Suppliers of hired vehicles, plant and equipment will be required to comply with this specification as well as the Occupational Health and Safety Act (Act no. 85 of 1993) and Regulations.

Construction vehicles and mobile plant to be:

- Of acceptable design and construction;
- Maintained in good working order;
- Used in accordance with their design and intention for which they were designed;
- Operated and/or driven by trained, competent and authorised operators/drivers. No unauthorised persons are to be allowed to drive construction vehicles and mobile plant;
- Provided with safe and suitable means of access;
- Fitted with adequate signalling devices to make movement safe including reversing;
- Provided with roll-over protection (where applicable);
- Inspected daily before start-up by the driver, operator and/or user and the findings recorded in a register/log book;
- Fitted with two head and two tail lights that are in good working condition and must be used whilst operating under poor visibility conditions;
- When used for transporting persons must have seats firmly secured and sufficient for the number of persons being transported.

- Operators and drivers of construction vehicles and mobile plant must be in possession of a valid medical certificate declaring the operator and/or driver physically and psychologically fit to operate or drive construction vehicles and mobile plant.
- No loose tools, materials etc. are allowed in the driver and/or operators compartment/cabin or in the compartment in which any other persons are transported.
- No person shall ride on any construction vehicle or mobile plant otherwise than in a safe place provided thereon for that purpose. Employees shall only be transported if provision for seating and safety belts has been provided with an adequate canopy or rollover protection.
- All construction vehicles and mobile plant left unattended at night, adjacent to a freeway in normal use or adjacent to construction areas where work is in progress, must have appropriate lights or reflectors, or barricades equipped with appropriate lights or reflectors, in order to identify the location of the vehicles or plant.
- Bulldozers, scrapers, loaders, and other similar mobile plant must, when being repaired or when not in use, be fully lowered or blocked with controls in a neutral position, motors stopped and brakes set.

All Drivers/Operators shall be appointed under the applicable legislation prior to operating any type of mobile equipment or machinery:

- If Driver/Operator does not adhere to the rules and regulations his appointment as operator shall be cancelled and he shall not be able to carry on with his duty.
- No Driver/Operator shall be appointed without proof of training, driver's licence or letter of competency.
- No training of Drivers/Operators on Site.
- No passengers on dump truck, Loaders or Excavators.
- No eating or drinking allowed while operating equipment.
- No vehicle shall be left unattended with engine running or key in ignition.
- Drivers may use no cellular phones during operations.

Equipment Approval

Authorization for the use of equipment shall be given in writing only after the following minimum requirements and documentation have been verified and shall as a minimum include the following:

- Minimum two lights in front and rear of vehicle
- Communications system (where required);
- Reflective Taping;
- First-aid kit, fire-fighting equipment and emergency roadside triangles;
- Tyres in good condition;
- Windscreen clear of cracks;
- Safety belts fitted for all occupants;
- Signage for clear identification;
- Windscreen wipers;
- Warning hooter and reverse alarm;
- Rotating warning lights (where applicable);
- Maximum number of persons indicated;
- Equipment free of oil and other leaks;
- Maintenance/Service & Equipment manuals available;

OPERATORS

a) The operator must carry out faithfully, efficiently and with due diligence all operations according to the instructions of the relevant JW Manager or representative.
b) Without first obtaining the written consent of the service provider, the relevant JW Manager or representative shall not permit or allow any person other than the operator or mechanic to operate any item of plant.

c) Only skilled operators may be employed with valid professional driving permits and any operator found to be unsuitable must be replaced immediately upon notification.
d) The service provider shall ensure that an Operator is provided to work during stand by and over time as agreed upon with the relevant JW manager while taking into consideration, the statutory limits for the number of working hours per week for an individual, as prescribed by the Department of Labour.
e) Where an Operator was working on standby \ over-time during the previous night, the service provider will be required to provide another Operator to operate the plant during normal working hours on the following day. No driver / Operator will be allowed to work longer than the hours prescribed by the Department of Labour.

Operator Approval

Authorization for operators for the use of equipment shall be given in writing only after the following minimum requirements and documentation have been verified and shall as a minimum include the following:

- Operator's Certificate (accredited training organisation);
- Operators Licence appropriate to the nature of the Mobile equipment;
- Operator's knowledge tested and familiar with the controls for the vehicle;
- Public driver's permit where required;
- Medical fitness certificate.

21.13.3 DOCUMENTATION OF PLANT

The following documents are required for desludging plant offered:

a) Proof of valid Certificate of Registration (RC1) in Respect of Motor Vehicle (as per National Road Traffic Act)
b) Proof of an actual (This is not a cutout document) valid license disc and a Roadworthy certificate (as per National Road Traffic Act).
c) Valid Insurance per category of plant offered.

20.15 LIFTING EQUIPMENT & MACHINERY

Lifting equipment must be designed and constructed in accordance with the manufactures/designers specifications as well as generally accepted technical standards and operated, used, inspected and maintained in accordance with the manufactures requirements as well as that of the of Driven Machinery Regulations promulgated in terms of the Occupational Health and Safety Act (Act no 85 of 1993).

The Driven Machinery Regulations requires that:

- Lifting equipment is clearly and conspicuously marked with the maximum mass load (MML) that it is designed to carry safely. When the MML varies with the conditions of use a table showing the maximum mass load with respect to every variable condition shall be posted up by the user in a conspicuous, place easily visible to the operator and the table shall be used by the driver/operator;
- Each winch on a lifting machine must at all times have, at least, three full turns of rope on the drum when the winch has been run to its lowest limit;
- Lifting equipment shall be fitted with a brake or other device capable of holding the MML. This brake or device shall automatically prevent the downward movement of the load when the lifting power is interrupted;
- Lifting equipment shall be fitted with a load limiting device that automatically arrest the lift when the load reaches its highest safe position or when the mass of the load is greater than the MML;
- Every chain or rope on a lifting machine that forms an integral part of the machine must have a factor of safety as prescribed by the manufacturer of the machine. Where no standard is available the factor of safety must be:
    - chains – 4 (four)
    - steel wire ropes 5 (five)
    - fibre ropes- 10 (ten)
- Every hook or load attaching device must be designed to prevent the load from slipping off or disconnecting;

- Every lifting machine must be inspected and load tested by a competent person every time it has been dismantled and re-erected and every 12 months after that. The load test must be in accordance with the manufacturer's requirements or to 110% of the MML. In addition, all ropes, chains, hooks or other attaching devices, sheaves, brakes and safety devices forming an integral part of a lifting machine must be inspected every 6 months by a competent person;
- All maintenance, repairs, alterations and inspection results must be recorded in a log book and each lifting machine must have its own log book; and
- No person may be lifted by a lifting machine not designed for lifting persons unless in a cradle approved by the inspector of the Department of Labour.

General requirements for cranes and lifting equipment

All documentation must be provided to the Johannesburg Water SOC Ltd Project Engineer prior to mobilisation. Failure to do so and the resulting cost of any delays and/or remedial activities will be for the Contractor's account.

All crane operators must be authorised by the relevant Engineer before they may operate a crane or lifting machine. The Load charts must be displayed at the crane.

Daily pre-use inspections of the cranes must be done and be kept on the file. The inspections must be logged in a logbook. The area in which a lift is performed must always be barricaded to prevent employees from entering.

A crane or lifting machine must not be left unattended and the keys may never be left in the ignition when the operator is not present. Properly constructed out rigger pads must be used when soil is uneven or unstable. (Only sleepers or appropriately designed steel plate pads may be used for this purpose).

Only a competent rigger may direct a lift of any kind unless the following requirements are met. Rigger assistants used for performing lifting operations shall be limited to lifts with all of the following requirements:

- Lifts lower than 5 tons
- Easy lifts that does not require the load to be lifted over structures, equipment or machinery
- Equipment that is not critical
- Rigging configuration that requires the attachment of several parts of lifting equipment such as chain blocks to adjust the angle of loads.
- All safety devices on a crane or lifting machine must be functional.

Certification will be required for record purpose, and shall cover the following:

- A Brake or other device capable of holding the maximum mass should the power fail, or which is such that it shall automatically prevent the uncontrolled downward movement of the load when the raising effort is interrupted; and
- A Limiting device which shall automatically arrest the driving effort when:
- The Hook or Load attachment point of the Power Driven lifting machine reaches its highest safe position; and
- In the case of a Winch Operated lifting machine with a lifting capacity of 5000kg or more, the load is greater than the rated mass load of such machine.

The user shall ensure that every lifting machine is operated by an Operator specifically trained for a particular type of lifting machine; the user shall not require or permit a person to operate such lifting machine unless the operator is in possession of a certificate of training, issued by an accredited person or organisation.

No Crane shall be used at arrival on site before copies of all documentation have been handed over to the Johannesburg Water SOC Ltd and the Crane have been checked by a person duly authorised and signed off as acceptable. Copies of all documentation shall be kept in the SHE File at all times.

No Crane shall be used without a pre-use check and findings entered on an approved checklist. Before any cranes are established on site the following must be inspected and approved:

- Operator's licences
- Training certificates

- Medical fitness certificate.
- The cranes load test certificate.
- Rope test certificates including Mill / Destructive test.
- The lifting gear load test certificates.
- The load limiting device calibration certificate.
- Proof that the hooks have been measured for spreading.
- The service inspection history.
- Monthly comprehensive inspection certificate
- Operation and maintenance Manuals and crane condition.

Cranes and Lifting Machines

A contractor shall ensure that where tower cranes are used:

- Account is taken of the effects of wind forces on the structure;
- Account is taken of the bearing capacity of the ground on which the tower crane is to stand;
- The bases for the tower cranes and tracks for rail-mounted tower cranes are firm and level;
- The tower cranes are erected at a safe distance from excavations;
- There is sufficient clear space available for erection, operation and dismantling;
- The tower crane operators are competent to carry out the work safely; and
- The tower crane operators are physically and psychologically fit to work in such an environment by being in possession of a medical certificate of fitness."

No user shall use or permit any person to use a Jib-Crane with a lifting capacity of 5000kg or more at a minimum Jib radius, unless it is provided with:

- A load indicator that shall indicate to the operator of the Jib-Crane the mass of the load being lifted, provided that such a device shall not require manual adjustment from the application of the load, to the Jib-Crane, until the release of the load.
- A Limiting Device, which shall automatically arrest the driving effort whenever the load is lifted, is greater than the rated mass load of the Jib-Crane.

Mobile Crane near Power Lines

No mobile cranes are to be used near overhead power lines until the Johannesburg Water SOC Ltd representative has been notified and provided safe access conditions and a valid permit to work is obtained. Mobile cranes shall be effectively earthed when working in the vicinity of electrical wires. Assume that all electrical equipment and wires are live and avoid them.

Lifting tackle

The following requirements will apply to lifting tackle:

- Manufactured of sound material, well-constructed and free from patent defects;
- Clearly and conspicuously marked with an identity number;
- MML factor of safety:
    - Natural fibre ropes - 10(ten)
    - Man-made fibre ropes and woven webbing - 06(six)
    - Steel wire ropes – single rope - 06(six)
    - Steel wire ropes – combination slings - 08(eight)
    - Mild Steel chains - 05(five)
    - High tensile/alloy steel chains - 04(four)
- Steel wire ropes must be examined by a competent person every three months and the results recorded in a designated logbook. The ropes must be discarded (not used any further for lifting purposes) when wear and corrosion is evident.

20.16 Horizontal Drilling

- All HDD work shall be carried out under the supervision of a competent person.
- All employees involves in HDD shall be trained.
- A risk assessment as well as a method statement for the HDD shall be compiled and submitted for approval by the Client.
- Contractor will submit specifications on directional boring equipment to be used to ensure that the equipment will be adequate to complete the project. Spares inventory shall be included
- The directional boring equipment shall consist of a directional boring rig of sufficient capacity to perform the bore and pullback the pipe, a boring fluid mixing & delivery system of sufficient capacity to successfully complete the crossing, a guidance system to accurately guide boring operations and trained and competent personnel to operate the system.
- All equipment shall be in good, safe operating condition with sufficient supplies, materials and spare parts on hand to maintain the system in good working order for the duration of this project.
- The directional boring machine shall consist of a hydraulically powered system to rotate, push and pull hollow drill pipe into the ground at a variable angle while delivering a pressurized fluid mixture to a guidable drill (bore) head.
- The machine shall be anchored to the ground to withstand the pulling, pushing and rotating pressure required to complete the crossing.
- The hydraulic power system shall be self-contained with sufficient pressure and volume to power boring operations.
- Hydraulic system shall be free of leaks.
- Rig shall have a system to monitor and record maximum pull-back pressure during pull-back operations.
- The rig shall be grounded during boring and pull-back operations.
- Sufficient spares shall be kept on hand for any break-downs which can be reasonably anticipated.
- The Guidance System shall be of a proven type and shall be setup and operated by personnel trained and experienced with this system.
- The Operator shall be aware of any magnetic anomalies and shall consider such influences in the operation of the guidance system if using a magnetic system.
- The Engineer must be notified 48 hours in advance of starting work.
- The Directional Bore shall not begin until the Engineer is present at the job site and agrees that proper preparations for the operation have been made.
- The Engineer approval for beginning the installation shall in no way relieve the Contractor of the ultimate responsibility for the satisfactory completion of the work as authorized under the Contract.
- It shall be the responsibility of Engineer to provide inspection personnel at such times as appropriate without causing undue hardship by reason of delay to the Contractor.

20.17 Working in proximity to Eskom / City Power power lines

- No mechanical equipment, including mechanical excavators, may be used under or in close proximity to Eskom's services without the prior approval of Eskom's authorized representatives. No excavations may be executed closer than 3 meters from any of Eskom underground electric power cables and 10 meters from Eskom overhead electrical power lines unless Eskom authorized representative is on site.
- No excavations may take place closer than 5m from any overhead line infrastructure (poles and stays and only excavation by hand will be allowed. Only excavation by hand will be allowed on the same route and in close proximity to the Eskom's 132 kV cables.
- The use of explosives of any type within 500 meters of Eskom's services shall only occur with Eskom's previous written permission. If such permission is granted the applicant must give at least fourteen working days prior notice of the commencement of blasting. This allows time for arrangements to be made for supervision and/or precautionary instructions to be issued in terms of the blasting process.
- The contractor shall be liable for any death or injury to any person or for the loss of or damage to any property caused in whatsoever manner by the contractor, his employees, agents or sub-contractors. The contractor's attention is drawn to section 27(3) of the Electricity Act 1987.

- The contractor is advised to negotiate a proper route with the CNC (Customer Network Centre. Lat Long co-ordinates of all proposed routes to be provided on site and during the application process. The contractor is required to provide the same to the CNC on site during the signing of the Stakeholder On-Site Risk Identification Form.
- Parallel encroachment into overhead power line servitudes is limited to one meter from the boundary of the servitude. (Where applicable for underground pipelines only.)
- All Eskom servitudes to be kept clear of any obstacles and other services. No dumping, manholes and illegal structures whether occupied by equipment or humans, shall be allowed directly underneath or within Eskom servitude areas.
- Eskom Overhead Lines, Cables and Eskom Plant to be adequately protected against other services and water sources.
- Adequate protection fence should be installed around all Eskom Overhead Structures. The type of fence will be proposed and approved by Eskom CNC / Engineering as listed above.
- Interlocking bricks to be used along all roads and reserves as to ensure Eskom cables could be easily accessed for maintenance and repair / emergency purposes. No roads should be tarred with Eskom cables within the road.
- For developer projects and other works that might affect access to Eskom mini-subs, an appropriate fence with access / gate as approved by the CNC should be installed on street front side.
- The applicant shall ensure that the existing natural ground level is maintained within the Eskom servitude area and where Eskom cables are affected. Should there be a need for the lifting of lines and / or replacement of existing structures / cables and application should be made via **Eskom Customer Services**.
- The vertical clearance required between the road surface and the 11kV / 22kV power-lines shall be at least 6.4m. (Where applicable.)
- Eskom Plant and Cables to be protected from proposed landscaping i.e. no big trees and large plants / scrubs (large roots.) to be planted in close proximity to Eskom services.
- Construction / Amendment of boundary wall/s / fences to be closely monitored with guidance from the CNC – where walls / fences are in close proximity of Eskom Plant.
- At all entrances and road crossings, corrosion-free sleeves must be installed at least 600 mm below undisturbed ground level to provide for existing and future installation of Eskom cables. (Where applicable.)
- Cross trenches by hand need to be done for each road crossing on both sides of the road before the services are installed, to ensure Eskom services do not get damaged during drilling operations. For installations where the service will be installed parallel to Eskom services, cross trenches need to be done by hand at regular intervals, which is to be determined by site conditions and the Eskom PPM cables representative.
- The contractor must inform and update Eskom PPM cables on a weekly basis of the on-site work being planned and performed.
- Equipment shall be regarded electrically live and therefore dangerous at all times.
- Eskom may stipulate any additional requirements to illuminate any possible exposure to Customers or Public to coming into contact or be exposed to any dangers of Eskom plant.
- Security must be on-site 24/7 when trenching and working in close proximity to the Eskom 132 kV cables
- Extra care must be taken when working in close proximity to the 132 kV cables. (Eskom's PPM cables can assist in identifying these cables on-site.)
- The contractor in charge of the construction or maintenance work on site must at all times be in possession of the Approved Wayleave letter of the affected Eskom services, as well as all plans related to the wayleave application. This should be available upon the request of any Eskom and Municipal official, during site visits. If no approval is presented, then the Eskom Official(s) can order that all work to be ceased until approval can be presented.

20.18 WATER ENVIRONMENTS

- The contractor must ensure that where construction work is done over or in close proximity to water, provision is made for—

- preventing persons from falling into water; and
- the rescuing of persons in danger of drowning.

- The contractor must ensure that where a person is exposed to the risk of drowning by falling into the water, the person is provided with and wears a lifejacket.

20.19 Welding, flame cutting, soldering and similar operations

1. No contractor shall require or permit welding or flame cutting operations to be undertaken, unless -

- the person operating the equipment has been fully instructed in the safe operation and use of such equipment and in the hazards which may arise from its use;
- effective protection is provided and used for the eyes and respiratory system and, where necessary, for the face, hands, feet, legs, body and clothing of persons performing such operations, as well as against heat, incandescent or flying particles or dangerous radiation;
- leads and electrode holders are effectively insulated; and
- the workplace is effectively partitioned off where practicable and where not practicable all other persons exposed to the hazards contemplated in bullet two are warned and provided with suitable protective equipment.

2. No contractor shall require or permit welding or flame cutting operations to be undertaken in a confined space, unless:

- effective ventilation is provided and maintained; or
- masks or hoods maintaining a supply of safe air for breathing are provided and used by the persons performing such operations.

3. No contractor shall require or permit electric welding to be undertaken in wet or damp places, inside metal vessels or in contact with large masses of metal, unless --

- the insulation of the electrical leads is in a sound condition;
- the electrode holder is completely insulated to prevent accidental contact with current-carrying parts;
- the welder is completely insulated by means of boots, gloves or rubber mats; and
- at least one other person who has been properly instructed to assist the welder in case of an emergency is and remains in attendance during operations: Provided that the provisions of this sub-regulation shall not apply to a welding process where the maximum voltage to earth does not exceed 50 volts.

4. No contractor shall require or permit welding, flame cutting, grinding, soldering or similar work to be undertaken in respect of any tube, tank, drum, vessel or similar object or container where such object or container --

- is completely closed, unless a rise in internal pressure cannot render it dangerous; or
- contains any substance which, under the action of heat, may --
  (i) ignite or explode; or
  (ii) react to form dangerous or poisonous substances,

unless a person who is competent to pronounce on the safety thereof has, after examination, certified in writing that any such danger has been removed by opening, ventilating or purging with water or steam, or by any other effective means.

(5) Where hot work involving welding, cutting, brazing or soldering operations is carried out at places, other than workplaces which have been specifically designated and equipped for such work, the employer shall take steps to ensure that proper and adequate fire precautions are taken.

20.20 Tunnelling

No person may enter a tunnel, which has a height dimension of less than 800 millimetres.

20.21 Occupational Hygiene

- The contractor must ensure that the exposure or potential exposure of his employees to any of the following stressors is assessed and measured to determine the effectiveness of control measures as well as compliance with legal and other requirements, particularly Occupational Exposure Limits.
    - Noise;
    - Thermal stress (heat and cold);
    - Particulates (dust);
    - Silica (free crystalline silica);
    - Asbestos;
    - Gases or vapours;
    - Lead;
    - Chemicals;
    - Vibration (hand / arm vibration and whole body vibration);
    - Ergonomics; and
    - Illumination.
- A baseline survey must be carried out by an Approved Inspection Authority: A plan for measuring and monitoring occupational exposure must be developed by the contractor. All monitoring results obtained must be analysed on a regular basis to:
    - Identify trends and potential exceedances of legal or other requirements (such as Occupational Exposure Limits);
    - Identify inconsistent or unusual results;
    - Evaluate the effectiveness of existing control measures;
    - Measure performance against stated objectives; and Identify continual improvement opportunities. Each exceedance of a specified requirement or limit must be recorded, investigated and reported. Appropriate corrective actions must be identified and implemented

20.22 Noise

Where noise is identified as a hazard the requirements of the NIHL regulations must be complied with and the following must be included / referred to in the Health and Safety Plan.

- Proof of training with regards to these regulations.
- That monitoring carried out by an AIA and done according to SABS 083.
- Medical surveillance programme is established and maintained for the necessary employees.
- Control of noise by means of:
    - Engineering methods considered
    - Admin control considered
    - Personal protective equipment considered/decided on
    - Describe how records are going to be kept for 40 years.

20.23 Asbestos work

- If asbestos is identified on site, then the contractor must ensure that any asbestos work is carried out by an Asbestos Contractor registered with the Department of Employment and Labour.
- All work must be halted and the area where asbestos identified demarcated.

- In the case of type 2 and type 3 asbestos work, the registered asbestos contractor must:
    - undertake only the type of asbestos work for which they are registered by the chief inspector;
    - appoint an occupational health and safety representative.
    - Obtain an up-to-date inventory of asbestos prior to asbestos work taking place from the Client
- Before commencement of any asbestos work and during such work, the registered asbestos contractor must ensure that—
    - a risk assessment is performed that includes—
        (i) identification of the hazards to which persons may be exposed;
        (ii) an assessment of the risks related to the hazards based on a documented method; and
        (iii) documented control measures to mitigate the risk;
    - the risk assessment) is reviewed—
        (i) at regular documented intervals;
        (ii) when an incident has occurred; and
        (iii) when the scope of work changes; and
        (iv) an up-to-date copy of the risk assessment is made available at the relevant asbestos work site.
- The registered asbestos contractor must—
    - ensure that the approved plan of work is submitted to the Chief Director: Provincial Operations at least seven days prior to commencement of asbestos work;
    - appoint in writing an asbestos removal supervisor for each asbestos work site, who must ensure—
        (i) occupational health and safety compliance on the asbestos removal site;
        (ii) compliance with safe asbestos removal or repair procedures;
        (iii) the correct use of personal protective equipment; and
        (iv) proper decontamination and waste disposal;
    - adhere to the repair or removal methodology and associated control measures provided in the plan of work approved for that specific asbestos work;
    - ensure that the employee medical and training records are available on site for inspection and validation;
    - ensure that at least the following information for every employee is recorded and kept for a minimum period of 50 years-
        (i) Physical address of every asbestos work project; and
        (ii) names and identification numbers of employees potentially exposed;
- before commencement of asbestos work, ensure that—
        (i) an approved inspection authority has been appointed in writing by the asbestos client; and
        (ii) the registered asbestos contractor is registered and in good standing with the Compensation Fund or with a licensed compensation insurer as contemplated in the Compensation for Occupational Injuries and Diseases Act, 1993; and

- where a fatality or permanent disabling injury occurs during asbestos work, ensure that a report about the fatality or injury is provided to the Chief Director: Provincial Operations, and that the report includes the measures that the contractor intends to implement to ensure safe asbestos work.

20.24 Pipe laying

- Before any pipe is laid, the contractor shall ensure that thorough preparation is made.
- The contractor shall review Designs & Specifications – Study engineering drawings and ensure all technical requirements are understood.
- The contractor shall only use HDPE pipes or any pipes and fittings with certified test reports. Ensure that there are no defects such as cracks, scratches, or uneven ends.
- Equipment Readiness – Ensure all tools—pipe cutters, fusion machines, measuring instruments—are calibrated and in good condition.
- Site Setup – Clear the work area, mark pipeline routes, and set safety signs.
- The contractor shall ensure that trench dimensions and base preparation meet design standards, and follow local codes / national standards, ensuring enough space for joining and compaction.
- Use approved bedding materials (e.g., sand or fine gravel) to prevent point loads and settlement.
- The contractor shall take the necessary steps to avoid water accumulation, and keep the trench dry during installation.

21. Monthly reporting

- The Principal Contractor is required to provide Johannesburg Water SOC Ltd. with a monthly report in the format provided on the last working day of the month.
- The report will include the monthly man-hours, incidents, training, inductions, audits, etc

22. Project close out

- Upon completion of the project, the contractor is required to hand over a consolidated project file to the Client with all the working documents for retention.
- The documents shall be submitted in an electronic format, preferably a memory stick or a downloadable link
- The contractor shall also ensure that the site is left in a safe manner that cannot cause injury or harm to JW employees or third parties.

Returnable Annexure A: Acknowledgement of SHE Specification & Annexures

CONTRACTOR:	

I, the undersigned, hereby acknowledge that I have obtained copies of the following listed documentation and confirm that I fully understand the contents thereof and the consequences of non-compliance. The Contractor furthermore reiterates its commitment to compliance of the requirements contained within the following provided documentation:

- Johannesburg Water SOC Ltd, Safety, Health & Environmental (SHE) Specification, Volume 2;
- Annexure 1: List of possible hazards emanating from projects and activities conducted for or on behalf of Johannesburg Water SOC Ltd;

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

CONTRACT MANAGER			
NAME	DESIGNATION	DATE	SIGNATURE
CONTRACT SUPERVISOR			
NAME	DESIGNATION	DATE	SIGNATURE
WITNESS (1)			
NAME	DESIGNATION	DATE	SIGNATURE
WITNESS (2)			
NAME	DESIGNATION	DATE	SIGNATURE

ANNEXURE 1:

BASELINE RISK ASSESSMENT

BASELINE RISK ASSESSMENT

Johannesburg Water	OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT	
	PROJECT NUMBER:	UR 1300
	PROJECT LOCATION:	Mayfair
	PROJECT DESCR:	Provision of emergency work - Mayfair

ACTIVITY: TRANSPORTATION OF MATERIALS TO SITE

Task	Hazard	Risk	Consequence	Rating	Controls
Transportation of material to site	✓ Unsafe road conditions ✓ Un-road worthy vehicles ✓ Equipment and material not safely secured ✓ Incompetent drivers ✓ Driving under the influence of alcohol ✓ Inclement weather ✓ Speeding ✓ Slippery road	✓ Overturning vehicles ✓ Vehicle collisions ✓ Bumping pedestrians / employees	✓ Injuries ✓ Property damages ✓ Third party liability	**M**	✓ Adherence to the speed limit ✓ Only competent/ authorised drivers should operate the vehicle ✓ Inspection of vehicles ✓ Equipment and material to be properly secured ✓ Alcohol testing to be done ✓ The road to be paved to prevent accidents ✓ Traffic control to be implemented to avoid collisions
Offloading of material	✓ Faulty lifting machinery & equipment ✓ Suspended load ✓ Poor housekeeping	✓ Malfunctioning ✓ Falling on employees ✓ Obstructed walkways by materials	✓ Injuries	**M**	✓ Inspect lifting equipment prior to use. ✓ Ensure the safe working load prior to use ✓ Train the employees in manual lifting ✓ Ensure proper housekeeping ✓ The correct PPE must be worn ✓ Designate the stacking areas and put signs ✓ Stacking and storage inspector must be appointed and in charge

ACTIVITY: SITE ESTABLISHMENT

Task	Hazard	Risk	Consequence	Rating	Controls
Site establishment	✓ Sharp objects/ wires ✓ Uneven surface ✓ Faulty connection ✓ Poor ergonomics ✓ Falling objects ✓ Inadequate security services ✓ Not enough ablution facilities	✓ Cuts ✓ Slips and trips ✓ Damage to services ✓ Using the environment as ablution facilities	✓ Injuries ✓ Back strains and injuries ✓ Crime, theft, fights ✓ Contracting of communicable diseases ✓ Soil, water pollution	**M**	✓ Supervisors to plan during site set up and induct employees ✓ A competent electrician must be appointed to connect electrical wires to the site offices and Distribution Board. ✓ Ensure there are welfare facilities on site for health and hygiene purposes ✓ Awareness on hygiene and use of ablution facilities ✓ Detailed Risk Assessment must be drawn before any work commences on site.
Installing containers	✓ Using lifting equipment ✓ Faulty equipment ✓ Faulty slings / chains	✓ Wind ✓ Incompetent personnel ✓ Heavy load ✓ Failing of lifting equipment	✓ Serious injuries ✓ Property damage	**H**	✓ Check wind speed prior to using the crane. ✓ Inspect the crane, slings and chains before use. ✓ Load test the crane before use ✓ Only carry loads certified to be carried by the crane
Entry and exit	✓ No access control	✓ Unauthorised entry into the construction site	✓ Injuries ✓ Theft	**M**	✓ Appoint a full time, registered security guard on site

Johannesburg Water	OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT	
	PROJECT NUMBER:	UR 1300
	PROJECT LOCATION:	Mayfair
	PROJECT DESCR:	Provision of emergency work - Mayfair

ACTIVITY: SITE ESTABLISHMENT

Task	Hazard	Risk	Consequence	Rating	Controls
Electrical installation	✓ Electricity ✓ Incompetent personnel ✓ Wrong tools ✓ Damaged cables	✓ Contact with live electricity ✓ Incompetent person connecting electricity ✓ Electric shocks	✓ Electrocution ✓ Serious injuries	**H**	✓ Follow lock out procedure ✓ Ensure that equipment are earthed to an approved earthing point ✓ Ensure a zero potential test is performed for electricity is isolated ✓ Inspect all tools ✓ Use correct tools for the job ✓ Appoint a competent electrician/ technician ✓ Wear task specific PPE ✓ Ensure that there are no exposed wires on the cables
Stacking and storage	✓ Unsafe stacks of materials or pallets	✓ Falling of pallets and material on employees ✓	✓ Injuries ✓ Property damage	**M**	✓ Supervision of all stacking of materials on site ✓ Materials of same base and heights stacked together ✓ Barricade the stacking area ✓ Unsafe stacks to be removed immediately ✓ Never stack materials during knocking off time or late at night. ✓ Use task specific PPE ✓ Stacking and storage supervisor to be appointed in writing.

ACTIVITY: SITE ESTABLISHMENT					
Task	**Hazard**	**Risk**	**Consequence**	**Rating**	**Controls**
					✓ Monthly inspections to be conducted on stacking and storing on site.
	✓ Substandard housekeeping	✓ Trip and falls	✓ Incidents / accidents	**L**	✓ High standards of housekeeping to be maintained.
	✓ Exposed material / equipment	✓ Theft	✓ Financial losses	**M**	✓ Ensure that there is sufficient security on site 24/7.

ACTIVITY: UNDERGROUND SERVICES

Task	Hazard	Risk	Consequence	Rating	Controls
Working close to Eskom line	✓ High voltage	✓ Electrocution	✓ Fatalities ✓ Power cuts ✓ Property damages	**H**	✓ Proper scanning of services prior to starting with excavations ✓ Obtain wayleaves from Eskom prior to starting with work ✓ Do not use lifting equipment in close proximity to power lines unless authorized to do so. ✓ Appoint an OHRVS to supervise all work done in close proximity to power lines ✓ Contact Eskom if services are identified for isolation ✓ Develop a method statement and risk assessment ✓ Train employees in the method statement as well as risk assessment ✓ Develop emergency response procedures for explosions
Working close to gas lines	✓ Gas leaks	✓ Explosion ✓ Suffocation ✓ Inhalation	✓ Fatalities ✓ Property damages		✓ Proper scanning of services prior to starting with excavations ✓ Obtain wayleaves from service provider prior to starting with work ✓ Develop a method statement and risk assessment ✓ Develop emergency response procedures for leaks and explosions

ACTIVITY: EXCEPTION

Task	Hazard	Risk	Consequence	Rating	Controls
Excavation	✓ Deep excavations ✓	✓ Collapse ✓ Falling ✓ Unsafe entry and exit	Fatalities	**H**	✓ Recommendations from the Geotech survey should be followed. ✓ Shoring of the excavation ✓ No unauthorised entry into the project site. ✓ Fencing off of the excavation and prompt supervision of the area. ✓ Full time security on site to monitor entry and exit. ✓ Safe method of entry and exit to be provided for employees ✓ Spoil material to be stored at least 2m away from the excavation ✓ Signage to be displayed indicating deep excavations ✓ Tracked excavator to be used where shallow soft rock is found
	✓ Incompetent operator ✓ Faulty excavator	✓ Overturning ✓ Bumping against people	✓ Serious injuries	**H**	✓ Only competent personnel may operate the excavator ✓ All excavators must be inspected prior to use

ACTIVITY: EXCAVATION

Task	Hazard	Risk	Consequence	Rating	Controls
Mechanical excavation	✓ Ignition on	✓ Accidental movement	✓ Fatalities ✓ Property damages	**H**	✓ Operators should ensure that the ignition is off prior to leaving the plant. ✓ Keys should be removed from the ignition and returned to the office for safekeeping,
Deep excavation	✓ Lack of safety signage	✓ Employees / passersby falling into excavations	✓ Fatalities	**H**	✓ Ensure that deep excavation signage is placed and visible. ✓ Deep excavations must be fenced off and access controlled.
	✓ Spoil material	✓ Collapse of excavation walls. ✓ Entrapment	✓ Fatalities	**H**	✓ Excavated soil to be placed at least 2m away from the excavation wall.
	✓ Underground service	✓ Contact with plant	✓ Injuries ✓ Property damages ✓ Electrocution	**H**	✓ All underground services to be identified and marked prior to excavation. ✓ Wayleaves from all service providers to be obtained prior to starting with excavations.
	✓ Unsafe access and exit	✓ Falling	✓ Injuries	**H**	✓ TLB / Excavator may not be used by employees to access and exit the excavation

ACTIVITY: EXCAVATION

Task	Hazard	Risk	Consequence	Rating	Controls
	✓ High water table	✓ Water ingress	✓ Drowning		✓ Continuous dewatering should be done where groundwater is encountered. ✓ Trenches should not be opened for longer periods, except with prior written consent ✓ Excavations must be inspected periodically and results recorded in an inspection checklist. ✓ Where there is uncertainty about the safety of the excavation, the declaration shall be made by a registered Engineering Technologist on the safety of the excavation. ✓ Backfilling should be done as per the relevant SANS code. ✓ If saturation of the trench occurs, sidewalls should be either battered or supported laterally.
	✓ Open excavations	✓ Falling of employees ✓ Collapse	✓ Injuries		✓ Trenches should not be opened for more than 3 days to prevent deterioration in trench stability and to reduce the risk of persons and motorists falling inside.
Backfilling	✓ Soil	✓ Entrapment	✓ Serious injuries	**M**	✓ Backfilling to be done by mechanical means where excavations are deep ✓ No unauthorized entry ✓ The correct types of backfilling material to be used for backfilling

ACTIVITY: EXCAVATION

Task	Hazard	Risk	Consequence	Rating	Controls
	✓ Unstable ground	✓ Excavation collapse	✓ Serious injuries ✓ Fatalities	**H**	✓ Ensure that backfilling is done according to relevant standards. ✓ Ensure that the area is well barricaded. ✓ Compaction tests to be done ✓ Put relevant signage ✓ No unauthorized entry to the construction site
Compacting	✓ Compactor ✓ Noise ✓ Dust ✓ Vibration	✓ Overexposure to noise and vibration ✓ Collapsing excavation wall ✓ Inhalation of dust	✓ Noise induced hearing loss ✓ Raynaud's Syndrome ✓ Injuries Respiratory problems	**M**	✓ Use of earmuffs by compactor operator ✓ Dust mask to be worn by compactor operator ✓ Compactor operator to be declared competent before using the machine ✓ Provide operator with anti-vibration gloves and provide rest periods in between. ✓

ACTIVITY: OPERATING CONSTRUCTION VEHICLES

Task	Hazard	Risk	Consequence	Rating	Controls
Operating construction vehicles and mobile plant	✓ Moving bucket / arm	✓ Hitting employees	✓ Injuries	**M**	✓ Workers to stand clear of the path of the construction vehicles and mobile plant ✓ Rigger to direct the loading and offloading activities
	✓ Incompetent operator	✓ Hitting employees; ✓ Bumping vehicles and properties	✓ Injuries ✓ Property damages	**M**	✓ Only trained, competent and appointed operators may operate a concrete truck ✓ Flagman to be posted to direct the operator
	✓ Unhealthy operator	✓ Collapsing whilst operating	✓ Fatalities ✓ Injuries to other people ✓ Property damages	**H**	✓ All operators to undergo annual medical examinations prior to resumption of duties ✓ All sick employees must report to their supervisors, and not be allowed to operate construction vehicles and mobile plant.
	✓ Speeding	✓ Hitting employees; ✓ Bumping vehicles and properties	✓ Injuries ✓ Property damages	**M**	✓ Site speed limits to be adhered to at all times
Parking	✓ No visibility ✓ Parking on a blind spot ✓ Uncontrollable movement	✓ Collision with other vehicles ✓ Bumping into people	✓ Fatalities ✓ Property damages	**H**	✓ Ensure that construction vehicles are parked at safe areas while conducting operations ✓ Use signage where trucks are parked in / near the road ✓ Place stop blocks to prevent any movement. ✓ Ensure that the key is removed from the ignition when parked.
Maintenance & inspection	✓ Suction hose ✓ Vacuum pump	✓ Heating up during operations	✓ Severe burns	**M**	✓ Avoid contact with the vacuum pump during or immediately after operation. ✓ Do not touch hot fluid or equipment ✓ Do not touch exhaust pipe of truck unless you are a trained professional carrying out maintenance or repairs ✓ Refueling to be carried out in

ACTIVITY: OPERATING CONSTRUCTION VEHICLES

Task	Hazard	Risk	Consequence	Rating	Controls
					✓ designated areas. Ensure spill kits are available and shutdown valve of the pump is available. ✓ Conduct a risk assessment of the refueling station
	✓ Hydraulic oil	✓ Contact with skin	✓ Severe burns ✓ Skin disease	**M**	✓ All pipe clamps fitted ✓ Pressure protection valves and Anti Drop valves fitted to hydraulic system. ✓ High pressure warning decals ✓ Hydraulic fluid lines to be inspected daily; cracks, tears and deformed lines must be reported and repaired prior to use.

ACTIVITY: PUMPING OUT WATER

Task	Hazard	Risk	Consequence	Rating	Controls
Pumping out water using machinery	✓ Vibration	✓ Over exposure	✓ Raynaud's syndrome	**M**	✓ Regular maintenance of all equipment ✓ Provide employees with anti-vibration gloves ✓ Provide rest periods for every 1hr worked
	✓ Noise	✓ Over exposure	✓ Noise induced hearing loss	**M**	✓ Regular maintenance of all equipment ✓ Provide employees with proper hearing protection ✓ Provide rest periods for every 1hr worked
	✓ Damaged pump / valves	✓ Sewer spillages	✓ Land and water pollution	**M**	✓ Inspect all equipment prior to starting work ✓ Perform bioremediation in case of spillages
	✓ Steep slopes	✓ High flow velocities	✓ Blockages ✓ Erosion (water forced around the pipe)		✓ Ensure that the flow is diverted to mitigate high velocities. ✓ Implement staged lining approach where smaller sections of the pipe are lined incrementally.
	✓ Mud	✓ Slip and falls	✓ Injuries	**L**	✓ Demarcate areas that are affected by pumping.
	✓ Formation of ponds	✓ Employees / public falling inside	✓ Fatalities	**H**	✓ Ensure that approval is given for formation of ponds. ✓ Ensure that ponds are fenced of

ACTIVITY: HDD

Task	Hazard	Risk	Consequence	Rating	Controls
Inserting the drilling rig	✓ Underground services such as gas or electricity	✓ Explosion ✓ Damages	✓ Fatalities	**H**	✓ Proper scanning of services prior to starting with excavations ✓ Obtain wayleaves from all utilities prior to starting with work ✓ Develop a method statement and risk assessment ✓ Train employees in the method statement as well as risk assessment ✓ Develop emergency response procedures for explosions
Inserting the drilling rig	✓ Vibration	✓ Road collapse	✓ Fatalities ✓ Property damages	**H**	✓ Only experienced service providers for pipe cracking should be appointed. ✓ Check Geotech conditions prior to starting with HDD ✓ Ensure that the correct depth is used for HDD ✓ HDD from JRA are always valid, and are complied with.
	✓ Vibration	✓ Exposure to excessive vibration	✓ Raynaud's syndrome	**M**	✓ Provide employees with sufficient rest periods for every 1hr worked.
Insertion	✓ Improper handling	✓ Hands getting caught ✓ Pipe slipping from hands	✓ Injuries	**L**	✓ Only trained employees may perform that task ✓ Training in the correct handling and connecting of bursting head

ACTIVITY: HDD					
Task	**Hazard**	**Risk**	**Consequence**	**Rating**	**Controls**
	✓ Machinery	✓ Exposure to excessive noise above 85dB(A)	✓ Noise-induced hearing loss	**M**	✓ Provide employees with hearing protection ✓ Regular servicing and maintenance of equipment ✓ Have a barrier wall where possible to shield the community from the noise.

ACTIVITY: MECHANICAL LIFTING

Task	Hazard	Risk	Consequence	Rating	Controls
Lifting using a crane	✓ Overhead lines	✓ Contact with crane	✓ Electrocution ✓ Property damages	**H**	✓ All lifting activities to be planned at least 2m away from overhead lines ✓ Obtain wayleaves from Eskom ✓ Appoint ORHVS
	✓ Wind / Unfavourable weather	✓ Deflection ✓ Loss of control	✓ Injuries ✓ Property damages	**H**	✓ Do not use during unfavourable weather conditions
	✓ Incompetent operator	✓ Loss of control ✓ Hitting structures and people	✓ Injuries ✓ Property damages	**H**	✓ Only trained and competent operators many operate the crane
	✓ Overloading	✓ Collapse of material	✓ Injuries ✓ Property damages	**H**	✓ Display safe working load on the crane
	✓ Faulty crane	✓ Malfunctioning	✓ Injuries ✓ Property damages	**H**	✓ Cranes to be inspected by competent persons prior to being used ✓ All faulty cranes to be tagged and locked out

ACTIVITY: PIPE LAYING & WELDING

Task	Hazard	Risk	Consequence	Rating	Controls
Pipe laying	✓ Steel ✓ Employees working around the excavation	✓ Static electricity ✓ Rough edges ✓ Heavy steel ✓ Hit by pipe	✓ Electrocution ✓ Injuries	**M**	✓ Ensure that pipes are earthed ✓ Provide gloves to employees ✓ Heavy pipes to be lifted mechanically
Pipe laying	✓ Crane	✓ Failure of the crane ✓ Employees	✓ Fatalities	**H**	✓ Inspect the crane prior to use. ✓ Only trained and competent person to operate the crane ✓ Employees to steer clear of lifting operations ✓ Faulty cranes to be tagged and not used ✓ Wind speed and direction to be considered before using the crane ✓ Crane to be load tested ✓ Only certified loads to be carried on the crane
Tie ins & pressure testing	✓ Pressurized water	✓ Hitting employees ✓ Burst	✓ Fatalities ✓ High water losses	**E**	✓ Ensure that the water is shut down ✓ Ensure that the correct class of pipe is used as well as valve specifications are correct ✓ Develop and follow a method statement ✓ Use only competent person to perform the task. ✓ Don't exceed pipe operating pressure, ensure pipe is correct diameter and is not damaged.

ACTIVITY: PIPE LAYING & WELDING

Task	✓ Hazard	✓ Risk	✓ Consequence	Rating	✓ Controls
Pipe welding	✓ Welding equipment	✓ Poor maintenance	✓ Injuries	**M**	✓ Welding equipment is visually checked before each use;
	✓ Welding	✓ Sparks	✓ Fire	**H**	✓ Welding screens to be used
		✓ Sparks	✓ Burns	**L**	✓ Fire resistant overalls and apron to be worn. ✓ Develop method statement for welding inside the pipe
		✓ Glare	✓ Arc eyes	**M**	✓ Welding glasses to be used
	✓ Confined space	✓ Entrapment ✓ Inability to move	✓ Injuries ✓ Suffocation	**H**	✓ Develop method statement for welding inside the pipe. ✓ Ensure that the welder is able to fit in properly inside the pipe and move with ease ✓ Use a different method of welding where the pipe's internal diameter is less than 800mm.
Compacting	✓ Compactor ✓ Noise ✓ Dust ✓ Vibration	✓ In-competent employee using the compactor ✓ Hearing loss ✓ Hand-arm vibration syndrome ✓ Collapsing excavation wall ✓ Inhalation of dust	✓ Injuries Respiratory problems	**M**	✓ Use of earmuffs by compactor operator ✓ Dust mask to be worn by compactor operator ✓ Compactor operator to be declared competent before using the machine

ACTIVITY: MECHANICAL WORKS

Task	Hazard	Risk	Consequence	Rating	Controls
Cutting and drilling	✓ Drilling ✓ Drill bit ✓ Drill sharp metal fibres ✓ High Noise Levels ✓ Cutting Grinder/Disc	✓ Vibration ✓ Cutting edges ✓ Eye penetration ✓ Finger cuts ✓ Expose to high noise level area ✓ Uncontrolled disc ✓ Electrical equipment failure ✓ Sharp window edges	✓ Damaged hearing ✓ Carpal tunnel syndrome ✓ Cuts/ injuries ✓ Eye irritation / blindness ✓ Injuries ✓ Eye injuries	**M**	✓ Use hearing protection when exposed to excessive noise levels (greater than 85 dB over an 8-hour work period) ✓ Assess noise level with sound level meter if possibility exists that level may exceed 85dB. ✓ Rotate drilling tasks to minimize worker exposure to equipment vibration. ✓ Use right size of a drill to drill different layers of the ground ✓ Assess manual guide carefully to ensure correct usage of portable electrical devices.

ACTIVITY: MECHANICAL WORKS

Task	Hazard	Risk	Consequence	Rating	Controls
Fueling the generator	✓ Spillages	✓ Slips, trips, falls	✓ Injuries	**L**	✓ Prevent spillages ✓ Use drip trays ✓ Use funnels for fueling
		✓ Fire	✓ Injuries	**M**	✓ No smoking allowed near the generator
	✓ Diesel fumes	✓ Inhalation	✓ Respiratory problems	**L**	✓ Provide employees with respirators
		✓ Skin contact	✓ Skin irritation	**L**	✓ Provide employees with gloves, safety boots and overalls
	✓ Running engine	✓ Explosion	✓ Injuries	**M**	✓ Switch engine off before refueling and make sure fuel cap is replaced. ✓ No smoking allowed near the generator
Running the generator engine	✓ Noise	✓ Over-exposure	✓ Noise-induced hearing loss	**M**	✓ Provide employees with hearing protection ✓ Provide rest periods for employees
	✓ Vibration	✓ Over exposure	✓ Raynaud's Syndrome	**L**	✓ Provide employees with vibration gloves. ✓ Rotate employees or provide rest periods.
	✓ Fumes	✓ Inhalation	✓ Respiratory problems	**L**	✓ Provide employees with respirators ✓ Never use indoors

ACTIVITY: GENERAL ACTIVITIES ON SITE

Task	Hazard	Risk	Consequence	Rating	Controls
✓ **Working on site**	✓ Unhappy community	✓ Community coming to survey site ✓ Violence against employees	✓ Property damages ✓ Serious injuries	**H**	✓ Develop an emergency response procedure ✓ Meet with the community and all stakeholders prior to commencement of the project ✓ Have the contact details of the nearest police station / JMPD offices
	✓ Unfavourable weather conditions	✓ Exposure to temperature extremes	✓ Heat exhaustion ✓ Frost bite	**M**	✓ Provide employees with water for cooling down. ✓ Provide employees with warm jackets and gloves during winter ✓ Provide 5-minute rest periods for every 30 minutes of exposure to temperature extremes. ✓ No work to be undertaken in rainy conditions
	✓ Housekeeping	✓ Trips and falls	✓ Injuries	**M**	✓ Ensure that proper housekeeping is maintained on site at all times.
✓ **Working near open spaces**	✓ Snakes	✓ Bites ✓ Poisoning	✓ Fatalities ✓ Serious injuries	**H**	✓ Inspect the area for snakes prior to entering ✓ Conduct snake awareness training ✓ Know the do's and don'ts of what to do when coming across snakes
	✓ Bees	✓ Bites	✓ Allergic reaction	**M**	✓ Inspect the area for bees / wasps prior to entering ✓ Conduct bees awareness training ✓ Know the do's and don'ts of what to do when coming across bees
✓ **Working near open spaces**	✓ Sharp objects	✓ Getting pricked by sharp objects	✓ Tetanus ✓ Injuries	**M**	✓ All employees to get Tetanus vaccination. ✓ Provide employees with proper safety boots

ACTIVITY: GENERAL ACTIVITIES ON SITE

Task	Hazard	Risk	Consequence	Rating	Controls
✓ **Working near open spaces**	✓ Criminals	✓ Getting mugged ✓	✓ Loss of personal possession	**M**	✓ Personal belongings such as phones and car keys to be safely put in pockets while working. ✓ Employees to report any suspicious activities to the local police. ✓ Equipment to be safety stored while not in use
	✓ Criminals	✓ Employees being attacked	✓ Injuries ✓ Fatalities	**H**	✓ Ensure that employees do not work in isolation. ✓ Employees to report any suspicious activities to the local police. ✓ Develop an emergency response procedure
	✓ Open excavations (other works)	✓ Falling inside	✓ Injuries	**M**	✓ Employees to be vigilant while working on site
	✓ Water bodies / channels	✓ Falling inside	✓ Serious injuries ✓ Fatalities	**H**	✓ Employees to be vigilant while working on site ✓ Emergency procedures to be developed
	✓ Rotating equipment	✓ Entrapment ✓ Getting caught by	✓ Serious injuries ✓ Fatalities	**H**	✓ Ensure that machinery is isolated or locked out while working on it.

RISK ASSESSMENT MATRIX

Likelihood	**Consequences**				
	Insignificant (minor problem easily handled by normal day to day processes	Minor (Some disruption possible e.g.,damage equal to R150k	Moderate (significant time / resources required. E.g., damage equal to R500k	Major (Operations severely damaged. E.g., damages equal to R1m	Catastrophic (business survival is at risk. Damage equal to R5m – 10m
Almost certain (90% chance)	High	High	Extreme	Extreme	Extreme
Likely (between 50-90%)	Moderate	High	High	Extreme	Extreme
Moderate (between 10-50%)	Low	Moderate	High	Extreme	Extreme
Unlikely (between 3-10%)	Low	Low	Moderate	High	Extreme
Rare (<3%)	Low	Low	Moderate	High	High

ANNEXURE 2:

MEDICAL SCREENING POLICY

JOHANNESBURG WATER (SOC) LTD

MEDICAL SCREENING POLICY

UR 1300: PROVISION OF EMERGENCY WORK - MAYFAIR

NOTICE

It is the Contractor's responsibility to ensure that medical surveillance requirements specified in the Occupational Health and Safety Act (85/1993) and Regulations and any other applicable legal and Johannesburg Water's requirements are fully complied with.

This document is meant to facilitate the Contractor's compliance to applicable requirements and does not replace the applicable legal requirements.

This document may be revised at any time to include applicable legal requirements not currently included that may come to the attention of Johannesburg Water in future. The Contractor will accordingly be responsible to comply with the revised requirements as might be necessary.

Where methods to ensure legal compliance have been specified in this document, Contractors may submit alternative detailed method statements for consideration and approval by Johannesburg Water. Johannesburg Water may, at its sole discretion, reject or accept such alternative methods.

1 PURPOSE OF THE MEDICAL SURVEILLANCE REQUIREMENTS PROCEDURE

The purpose of this Medical Surveillance Requirements Procedure is to facilitate the achievement of legal compliance relating to medical surveillance by all Consultants, Contractors, Subcontractors and suppliers that will be working on the Johannesburg Water project and to ensure that employees are fit to work in the roles that they have been employed to execute and remain so for their duration on the project site.

This document represents the minimum requirements for medical surveillance and does not replace applicable legal requirements.

2 MEDICAL SURVEILLANCE OBJECTIVES

The Johannesburg Water main objectives for medical surveillance are:

a) To ensure compliance with all applicable medical surveillance legal requirements.
b) To ensure compliance with all Johannesburg Water's requirements regarding medical surveillance.
c) To ensure that employees are fit to execute the work for which they have been employed.
d) To prevent employees from acquiring occupational diseases or illnesses.
e) To ensure early detection and treatment of occupational diseases and to prevent the aggravation of existing medical conditions.
f) To ensure that employees on departure from the project have not contracted any occupational diseases and to enable any such condition that arises to be suitably addressed.

All contractors are required to demonstrate total commitment towards the achievement of these objectives.

3 GENERAL REQUIREMENTS

3.1 The Principal Contractor shall ensure that a medical surveillance programme is implemented for all employees.

3.2 An initial health evaluation shall be carried out by an occupational health practitioner immediately after a person commences employment, where any exposure exists or may exist, which comprises:

- an evaluation of the employees medical and occupational history;
- a physical examination; and
- any other essential examination which in the opinion of the occupational health practitioner is desirable in order to enable the practitioner to do a proper evaluation.

3.3 Medical surveillance & Immunization shall be done accredited institutions or occupational health doctor, including, but not limited to:

a) Audiograms.
b) A cardio-respiratory examination, including full size chest x-rays (If lung function tests are abnormal)
c) Lung function tests.
d) Eye/ sight tests.
e) A general physical examination.
f) A review of previous medical history.
g) Blood pressure tests
h) Glucose tests

Copies of all medical certificates shall be submitted to the Johannesburg Water Project Specialist or Appointed OHS Agent to prior to site establishment and before an employee is allowed to come onto site.

Specific attention shall be given to the physical and psychological fitness of people who will be required to work in elevated positions and operators of mobile machinery.

An exit medical certificate shall be obtained for all workers at the end of the contract and for all workers who leave the employment of the Contractor before the end of the Project. Copies of all

exit medical certificates shall be submitted to the Johannesburg Water Project Specialist or Appointed OHS Agent.

Medical surveillance shall address all occupational health risks to which the employee is exposed, identified through the risk assessment referred to in section 4 below.

Retention monies will be withheld if the exit medical is not complete for all employees.

The cost of all medical examinations will be borne by the Contractor as provision is made on the bill of quantities.

4 OCCUPATIONAL HEALTH RISK ASSESSMENT

4.1 The Contractor shall conduct an occupational health risk assessment prior to site establishment.

4.2 The Contractor shall ensure that, as far as is reasonably practicable, ergonomic related hazards are analyzed, evaluated and addressed in the risk assessment.

4.3 The methodology used by the contractor to assess occupational health risks associated with their activities shall be submitted to Johannesburg Water for approval by the Johannesburg Water Project Specialist or Appointed OHS Agent prior to site establishment. The methodology should take the following into consideration, among others:

a) Legal requirements.
b) Normal activities undertaken by the contractor.
c) Abnormal situations (e.g. unanticipated breakdown of equipment etc).
d) Emergency situations (e.g. fires, exposure to chemicals).
e) Changes in work procedures and methods.
f) Previous experience.

4.4 A risk register that will include the following shall be submitted to the Johannesburg Water Project Specialist or Appointed OHS Agent before site establishment.

a) All occupational health risks identified during the occupational health risk assessment.
b) A list of the occupational health risks that have been identified as being significant.

c) Reference to the method statements, measures or procedures that will be followed to either eliminate or reduce the significant risks to tolerable levels.

4.5 The Contractor shall, in writing, clearly explain how each occupational health risk assessed to be significant will be addressed to eliminate or reduce it to a tolerable level and submit it for approval by the Johannesburg Water Project Specialist or Appointed OHS Agent before site establishment. This may be through method statements or written operational control procedures. Associated responsibilities and authorities shall be clearly defined. All method statements shall reflect at least:

a) When the activities relating to the method statement will be conducted (timing).
b) Materials to be used.
c) Equipment and staffing requirements.
d) The proposed construction procedure designed to implement the relevant requirements.
e) The system to be implemented to ensure compliance with the method statement.
f) Any other information deemed to be necessary by the Johannesburg Water Project Specialist or Appointed OHS Agent and/or the contractor's responsible person.

4.6 For significant occupational health risks identified after site establishment, method statements shall be submitted to the Johannesburg Water Project Specialist or Appointed OHS Agent at least 10 working days before the start of the associated activity, when possible.

4.7 All changes to approved method statements or procedures shall be approved in writing by the Johannesburg Water Project Specialist or Appointed OHS Agent.

4.8 The contractor's Responsible Person shall retain records of any amendments and shall ensure that only the most current approved version of any method statement or procedure is used.

4.9 Every occupational health risk that is identified during the risk assessment process shall be conveyed to every employee whose work is associated with the risk. This may be done in the form of a toolbox talk but does not replace the toolbox talk entirely. Each employee shall sign to confirm an understanding of the occupational health risks in the tasks.

4.10 Occupational health risk assessments may be combined with safety and environmental risk assessments, but the consideration of occupational health issues shall be clearly reflected in the records generated and maintained.

4.11 The occupational health risk assessment process and effective implementation of measures to eliminate or reduce identified risks is the responsibility of the Contractor. Johannesburg Water will closely monitor the effectiveness of implemented measures.

Acknowledgement of JW Medical Screening Policy

Name of Contractor

I, the undersigned, hereby acknowledge that I have obtained copies of JW Medical Screening Policy and confirm that I fully understand them and the consequences of non-compliance.

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

Signature of Contractor / Mandatory **Date**

---------- **----------**

Signature of 16.2 / Construction Manager **Date**

---------- **----------**

Witness 1 …… **Witness 2 ……**

ANNEXURE 3:

SIGN OFF FORM

OHS CONTRACTORS' MANAGEMENT SYSTEM				
TENDER DOCUMENT SHE SPECS SIGN-OFF FORM				Johannesburg Water
REQUESTED BY	**Tawandira Mpandaguta**	**DATE**	**13-02-2026**	**UR 1300**

UR 1300: Provision of emergency work - Mayfair

LIST OF SHE SYSTEM ATTACHED TO THE TENDER DOCUMENT

SHE SYSTEM ATTACHED	Y/N	VERSION	NO PAGES	REMARKS
Volume 2 OHS Specification & Acknowledgement Form	Y	V2 – 09/16	37	For info
Baseline Risk Assessment	Y	V01 – 05/15	23	For info
Medical Screening Policy	Y	V01 – 05/15	8	For info
Returnable Annexure A	Y	V02 - 02/20	1	Return with tender document

ANNEXURE 4:

ENVIRONMENTAL MANAGEMENT PLAN

ENVIRONMENTAL MANAGEMENT PLAN

JOHANNESBURG WATER SOC LTD

ENVIRONMENTAL MANAGEMENT PLAN

REVISION:05

Prepared By:

OHSE & DM

Environmental Management Section

Johannesburg Water SOC (Ltd)

PO Box 61542

Marshalltown

2001

DISCLAIMER

1. Should there be any other Environmental related activities issued as non-compliance during construction, the contractor is liable to comply with those requirements
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3. This EMP does not exempt the Contractor from complying with other relevant legislations related to the construction activities.

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LIST OF ACRONYMS

Acronym	Description
BA	Basic Assessment
BAR	Basic Assessment Report
CA	Competent Authority

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DEA	Department of Environmental Affairs
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EO	Environmental Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme Report
GDARD	Gauteng Department of Agriculture and Rural Development
GN	Government Notice
I&AP	Interested and Affected Party
JW	Johannesburg Water
km	Kilometre
m	meter
MSDS	Material Safety Data Sheets
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NWA	National Water Act, 1998 (Act No. 36 of 1998)
PHRAG	Provincial Heritage Resources Authority for Gauteng
RE	Resident Engineer
WUL	Water Use License
WULA	Water Use License Application
WWTW	Wastewater Treatment Works

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DEFINITIONS

Environment

The surroundings in which humans exist and which comprise of:

- Land, water, and atmosphere of the earth.
- Micro-organisms, plant, and animal life.
- Any part or combination of a) and b) and the interrelationships among and between them.
- The physical, chemical, aesthetic, and cultural properties and conditions of the foregoing that can influence human health and well-being.

Environmental Aspect

Those components of the company's activities, products and services that is likely to interact with the environment.

Environmental Authorisation

The written statement from the relevant environmental authority in terms of the National Environmental Management Act (Act 107 of 1998), with or without conditions, that records its approval of a planned activity and the implementation thereof and the mitigating measures required to prevent or reduce the effects of environmental impacts during the life of a contract.

Environmental Impact Assessment (EIA)

The decision-making process of examining the environmental impacts of a development in terms of the NEMA (107 of 1998) and the EIA Regulations (Government Notice No. R982, R983, R984, R985 and R986) as amended.

Environmental Management Programme (EMPR)

An environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the projects are enhanced.

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Environmental Management System (EMS)

A set of process and practices that enable an organization to reduce its environmental impacts and increase its operational efficiency. The EMS provides a framework that helps a company achieve its environmental goals through consistent control of its operations.

Auditing

A systematic and objective assessment of an organization's activities and services conducted and documented on a periodic basis internally and externally.

Environmental Objective

An overall environmental goal, arising from the environmental policy, that an organization sets itself to achieve, and which is quantified where practicable.

Environmental Target

A detailed performance requirement quantified where practicable, applicable to the organization or parts thereof, that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives.

Floodplain

A flat expanse of land bordering a river channel, formed through sediment deposition and other alluvial processes, and often characterized by frequent flooding as a result of bank overspill from the river channel.

Groundwater

Sub-surface water in the zone in which permeable rocks, and often the overlying soil, are saturated.

Hazardous waste

Waste that are proven to be toxic, corrosive, explosive, flammable, carcinogenic, radioactive, poisonous or classified as such in legal terms.

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Heritage Resource

Any place or object of cultural significance including buildings, structures, landscapes, graves and geological, archaeological artefacts and paleontological sites.

Landscape

Land modified for human use and occupation, embracing both the natural (wilderness) environment and the urban.

Management actions

Practical actions aimed at achieving management objectives and targets.

Management objectives

Desired outcome of management measures for mitigating negative impacts and enhancing the positive impacts related to project activities and aspects (i.e. risk sources).

Monitoring

A systematic and objective observation of an organization's activities and services conducted and reported on regularly.

Natural Vegetation

All existing vegetation species, indigenous or otherwise, of trees, shrubs, groundcover, grasses and all other plants found growing on the site.

Pollution

Any change in the environment caused by substances, radioactive or other waves, or noise, odours, dust or heat, emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience

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and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future. Furthermore, pollution can also be regarded as an undesirable state of the natural environment being contaminated with harmful substances because of human activities.

Protected Plants

Plant species officially listed on the Protected Plants List (each province has one), and which may not be removed or transported without a permit to do so from the relevant provincial authority.

Reinstatement

Reinstatement is defined as the return of a disturbed area to a state, which approximates the state (where possible), which it was before disruption.

Riparian Habitat

The physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas.

Runoff

The total water yield from a catchment including surface and subsurface flow.

Sensitive environmental features

Environmental features protected by legislation (e.g., heritage resources), or identified during the EIA as sensitive through specialists' findings and input received from Interested and Affected Parties.

Subsoil

The soil horizons between the topsoil horizon and the underlying parent rock.

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Topsoil

Topsoil can be regarded as the fertile upper part or surface of the soil.

Transplanting

The removal of plant material and replanting the same plants in another designated position.

Veld

Unimproved areas of natural vegetation

Wastewater

Water contaminated by the project activities.

Watercourse

A geomorphological feature characterized by the presence of a stream flow channel, a floodplain and a transitional upland fringe seasonally or permanently conveying surface water.

Waterlogged

Soil or land saturated with water long enough for anaerobic conditions to develop.

Weeds and Alien Invasive Plants

Weeds and Alien Invasive plants are defined as undesirable plant growth that shall include, but not be limited to all declared category 1, 2 and 3 listed Alien Invasive species as set out in the Conservation of Agricultural Resources Act (No 43 of 1983) regulations. Other vegetation deemed to be invasive should be those plant species that show the potential to occupy in number, any area within the defined construction area.

Wetland

Land where a surplus of water (i.e., waterlogging) is the key factor determining the nature of the soil development as well as the types of plants and animals living at the soil surface.

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1. BACKGROUND

The purpose of this document is to provide management measures that will ensure that potential negative impacts associated with the activity are minimized whilst positive impacts are optimised, provided that the EMP is implemented by a suitably qualified Environmental Officer (EO). The development proponent, the main contractor and the sub- contractor are responsible for the implementation of the EMP throughout the stages. Therefore, it is imperative that the EMP is circulated to site managers, contractors and Depots who will perform any work on site which has the potential to cause environmental damage. Any parties responsible for transgression of the underlying management measures outlined in this document will be held liable for non- compliances.

The following is a generic EMP to mitigate against “generally occurring impacts” associated with the construction phase of Johannesburg Water’s activities. "Generally occurring impacts" refers to potential impacts typical of Johannesburg Water’s activities and are not restricted to a single or specific site. The findings of this EMP will be implemented at all sites.

This section is an essential component of the contract specification and shall be included during **planning, design, construction, and operational phases.**

PURPOSE

The purpose of this EMP is to ensure that Johannesburg Water conducts all its activities related to the construction and maintenance in accordance with the provisions of NEMA, and other applicable legislations. This EMP has considered the provisions of the Constitution and the principles of Integrated Environmental Management.

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2. APPLICABLE LEGISLATIONS

Several laws and regulations apply to the protection of the environment. These laws contain environmental principles and standards that need to be applied when applicable permits and licences that need to be obtained. This EMP will be subject to regulatory control under a range of State, Provincial and Local regulations. Such legislation largely embraces pollution prevention, sustainable resource use, conservation, and socio cultural (heritage) protection. This chapter reviews legislation pertaining to this generic EMP.

According to Section 2 (1, 2 & 3) of the National Environmental Management Act No. 107 of 1998 (NEMA), all organs of state must apply certain principles set out in NEMA when taking decisions that may significantly affect the environment. The key principles of this Act include that all "actions" that they approve must be economically, socially, and environmentally sustainable. It further states that "people and their needs" must be at the forefront of "its concern" and their interests must be served equitably. These legislative requirements include, but are not limited to, the provisions of the legislation represented as described below:

The Constitution of the Republic of South Africa Act No. 108 of 1996)

Section 24 of the Constitution of South Africa (Act 108 of 1996) states that "Everyone has the right (a) to an environment that is not harmful to their health or well-being; and

(b) To have the environment protected, for the benefit of present and future generations through reasonable legislative and other"

Measures that:

- Prevent pollution and ecological degradation;
- Promote conservation; and
- Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development".
- Section 152 of the Constitution states that the objectives of local government are to:
- Ensure that services are provided to communities in a sustainable manner.

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- Promote social and economic development; and
- Promote a safe and healthy environment.

National Environmental Management Act No. 107 of 1998 (as amended)

The National Environmental Management Act 107 of 1998 (NEMA) requires that an environmental authorization is obtained before activities, which have been listed in terms of NEMA, are commenced with. The failure to obtain such an environmental authorization, before commencing with listed activities, could result in administrative sanctions, including compliance notices or directives ordering the cessation of the operations until authorized; and fines of up to ZAR10 million for each such contravention.

The Environmental Impact Assessment Regulations (EIA Regulations) set out the process to be followed in applying for an environmental authorization, while the listing notices; list the activities that require authorization (the Listing Notices). NEMA 107 of 1998 amended in 07 of April 2017.The following are the listed activities:

- EIA Regulations GNR 326
- Listing Notice 1; Government Notice Number (GNR) 327 (Basic Assessment).
- Listing Notice 2; Government Notice Number (GNR) 325 (Full EIA/ Scoping & Environmental Impact Report).
- Listing Notice 3; GNR 324 (It applies on both Basic Assessment and full EIA).

National Environmental Management: Biodiversity Act No. 10 of 2004

Provides management and conservation of South Africa's biodiversity within the framework of NEMA 107 of 1998; the protection of species and ecosystems that warrant national protection and the sustainable use of indigenous biological resources.

The National Environmental Management Waste Act 59 of 2008

The National Environmental Management Waste Act (NEMWA) reforms the law regulating waste management in order to protect health and the environment providing reasonable measures for the

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prevention of pollution and ecological degradation and for securing ecologically sustainable development; to provide for institutional arrangements and planning matters; to provide for national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management measures; to provide for licensing and control of waste management activities; to provide for the remediation of contaminated land; to provide for the national waste information system; to provide for compliance and enforcement; and to provide for matters connected therewith.

The Occupational Health and Safety Act No. 85 of 1993

The Occupational Health and Safety Act make provision in regulation

- Section 8 for the general duties of employers to their employees.
- Section 9 of the Regulations makes provision for general duties of employers and self-employed persons to persons other than their employees.

National Heritage Resources Act (NHRA) No. 25 of 1999

The protection and management of South Africa's heritage resources are controlled by the National Heritage Resources Act. The South African National Heritage Resources Agency (SAHRA) is the responsible authority for implementing the National Heritage Resources Act (NHRA) 1999, (Act 25 of 1999).

Section 38(1) of the NHRA lists development activities that would require authorisation by the responsible heritage resources authority. Activities considered applicable to the proposed project include the following:

(a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length.

(b) the construction of a bridge or similar structure exceeding 50 m in length; and

(c) any development or other activity which will change the character of an area of land, or water -

i exceeding 5 000 m² in extent,

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ii involving three or more existing erven or subdivisions thereof; or

iii involving three or more erven or divisions thereof which have been consolidated within the past five years; or

iv the costs of which will exceed a sum set in terms of regulations by SAHRA or a Provincial Heritage

v Resources Authority.

(d) the re-zoning of a site exceeding 10 000 m^2 in extent; or

(e) any other category of development provided for in regulations by SAHRA or a Provincial Heritage Resources Authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature, and extent of the proposed development.

Water Services Act No. 108 of 1997

This Act provides for the rights of people to basic water supply amongst others basic sanitation. It acknowledges that that there is a duty on all spheres of government to ensure that sanitation services are provided in a manner which is efficient, equitable and sustainable and that it should be sufficient for subsistence and sustainable economic activity. The provision of sanitation services must be undertaken in a manner consistent with the broader goals of water resource management. This goal is in line with the Act as it aims to provide sufficient sanitation services to the region in a sustainable manner.

Conservation of Agricultural Resources (CARA) Act, Act No. 43 of 1983

The CARA aims to ensure the protection of agricultural resources such as land with agricultural potential and water and makes provision for the eradication of alien and invasive species, and protection of topsoil.

NEMA Air Quality Act (AQA), Act No. 39 of 2004

The aim of this law is to regulate air quality and protect the environment in South Africa through reasonable measures to prevent pollution and ecological degradation, while securing sustainable development. The Act also provides national norms and standards for air quality management, monitoring, and control. Under this legislation, Priority Air shed Areas can be proclaimed, where specific

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Air Quality Management Plans are applicable. Regulations are also published under this Act for the format of air quality assessments and what should be included in the assessment. Any Air Quality Management Plan which has been compiled for the area and any proposed WwTW should be in line with this Management Plan. This Act may list activities which may result in atmospheric emissions, and which may have a significant detrimental effect on the environment.

Government Gazette 32434 of 24 July 2009 listed activities, which require an atmospheric emission license before it commences. Air quality limits and thresholds are fundamental to effective air quality management, providing the indicators to safe exposure levels for most of the population. The current South African standards have been revised and National Ambient Air Quality Standards were promulgated on the 24th of December 2009 (Government Gazette No. 32816, Notice No. 1210). The newly proposed standards include particulate matter specifically PM10 (particulates with a diameter of less than 10 micrometre), sulphur dioxide (SO2), nitrogen dioxide (NO_2), ozone (O3), lead, carbon monoxide (CO) and benzene. These revised standards have been adopted as the VTAPA air quality objectives. Any emissions from the proposed WWTW should be within these standards.

National Water Act (NWA), 36 of 1998

Water use is controlled by the National Water Act (NWA) Act No. 36 of 1998. The NWA recognises that water is a scarce resource in South Africa and its provisions are aimed at achieving sustainable use of water to the benefit of all users. The provisions of the Act are thus aimed at discouraging pollution and waste of water resources. According to Section 21 of the NWA the following activities require a water use licence (WUL) prior construction:

"21.(a) taking water from a water resource;

21.(b) storing water;

21.(c) impeding or diverting the flow of water in a watercourse;

21.(d) engaging in a stream flow reduction activity contemplated in section 36;

21.(e) engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);

21.(f) discharging waste or water containing waste into a water resource through a pipe, canal,

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sewer, sea outfall or other conduit;

21.(g) disposing of waste in a manner which may detrimentally impact on a water resource;

21.(h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;

21.(I) altering the bed, banks, course or characteristics of a watercourse;

21.(j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and

21.(k) using water for recreational purposes."

3. OBJECTIVES OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

The purpose of this EMP is to provide an easily interpreted reference document that ensures that the project environmental commitments, safeguards and mitigation measures from the environmental planning documents, project approvals, and scope of work are implemented.

The objectives for the EMP are:

- To develop, implement and maintain effective management systems for the environmental aspects.
- To document details of environmental protection infrastructure and controls so that they can provide long term protection for the natural environment.
- To ensure compliance with relevant legislation (National, Provincial and Local), regulatory requirements and environmental documents.
- To maximise the value and outcomes of environmental monitoring activities so that the information can be applied to the planning and implementation of future projects.
- To ensure that all Environmental Management considerations are implemented during the planning, operational and maintenance phases of the project.

All the environmental specifications and the procedures discussed in this document were also developed in accordance with the relevant legislation applicable to the development.

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3.1 Phases of the Project

The EMP deals with the following phases as detailed below:

3.1.1 The Planning and Design Phase

Overall Goal for Planning and Design: Undertake the planning and design phase of the development in a way that:

- Ensures that the design of the proposed development responds to the identified environmental constraints and opportunities.
- Ensures that the best environmental options are selected for all components of the project.
- **Ensures that there is sufficient financial provision for environmental assessment, monitoring, rehabilitation, and maintenance. The JW rehabilitation calculation template must be used (See Annexure D).**
- The qualified landscaping specialist must be appointed to undertake rehabilitation on site. The landscaping specialist must pose the following qualifications and work experience:

  - Landscaping Specialist should at least have BA/BSc Honours Degree or 4-year Degree in Natural Sciences/Ecological

  - The Landscaping Specialist must at least be registered with South African Council for Natural Scientific Professions (SACNASP) as a Professional Natural Scientist (Copy of SACNASP Certificate must be submitted).

  - At least three letters from their client/s must be submitted, detailing the landscaping work he/she has undertaken (letters should have the name of the client, description of the project and/or scope of work done, contact details and must be signed). Letters should be in their client's company letterhead, and it must indicate if the work has been completed satisfactorily or not. - Copy of CV must be submitted, specialist should at least have a minimum of five (5) years working experience as landscaping Specialist (See Table 1).

  The EMP offers an ideal opportunity to incorporate pro-active environmental management measures with the goal of attaining sustainable development.

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Pro-active environmental measures minimize the chance of impacts taking place during the construction and operational phase. There is still the chance of accidental impacts taking place; however, through the incorporation of contingency plans (e.g., this EMP) during the planning phase, the necessary corrective action can be taken to further limit potential impacts. In order to meet this goal, action plans for planning and design stages of the project must be identified together with monitoring requirements.

3.1.2 The Construction Phase

The bulk of the impacts during this phase will have immediate effect (e.g., noise-, dust- and water pollution etc.) If the site is monitored on a continual basis during the construction phase, it is possible to identify these impacts as they occur. These impacts will then be mitigated through the contingency plans identified in the planning phase, together with a commitment for sound environmental management from Johannesburg Water and its agents.

3.1.3 Rehabilitation and Reinstatement Phase

This phase will involve restoring the land impacted during the construction phase back to its original state (in the case of slopes, gradients, soil profiles, and hydrology) or better. This process will be mainly on rectifying the negative impacts that have been caused during construction by the removing pollution or contaminants and other dangerous substances from groundwater, sediment, or surface water and improvement of the soil.

3.1.4 The Operational Phase

By taking pro-active measures during the planning and construction phases, potential environmental impacts emanating during the operational phase will be minimised. This, in turn, will minimise the risk and reduce the monitoring effort, but it does not make monitoring obsolete.

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4. ROLES AND RESPONSIBILITY

The implementation of this EMPr requires the involvement of several stakeholders, each fulfilling a different but vital role to ensure sound environmental management during the construction and operational phases. The stakeholders are discussed below:

4.1 Johannesburg Water and its Agents shall:

Ensure that the EMP is kept on JW's Sites and construction sites.

- Remain ultimately responsible for ensuring that the development is implemented according to the requirements of the EMP.
- Ensure that the Environmental section attends all project related tender briefing sessions.
- Although Johannesburg Water appoints specific role players to perform functions on its behalf, this responsibility is delegated.
- Be liable for restoring the environment in the event of negligence leading to damage to the environment.
- Ensure that the EMP is included in the tender documentation so that the contractor who is appointed is bound to the conditions of the EMP, and there's sufficient budget for environmental assessments and/or assessment during the planning, design, construction, replacement of vegetation and restoration of habitats, decommissioning (rehabilitation) phases of the project.
- Ensure that the contractor appointed understands, acknowledges and fully accepts the content of this EMP and their responsibilities for implementation and compliance.
- Monitor compliance with the conditions of the environmental authorisation and the EMP and compliance audits are undertaken.
- Ensure that the Environmental section signs all close out reports to confirm rehabilitation.

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4.2 Appointments and competencies

- The contractor and its appointed sub-contractor must meet the relevant legislative and non-statutory appointments, which must be maintained valid for the entire contract duration.
- All appointees shall be suitably trained and certified competent for the responsibilities they are assigned for.
- Copies of all relevant appointments and the relevant competence certificates must be kept in the relevant Environmental file.

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Table 1: Environmental Officer's Appointment Index

Appointment	Project Type	Legislative Ref	Competency requirements (Min)
Contractor SHE Officer	Unauthorised Project	JW EMP/ JW Waste Management Procedure	National Diploma in Safety & ISO14001:2015 (Introduction/Awareness, implementation, and auditing ISO14001:2015) + 2 years' Experience **OR** National Diploma in Environmental Management + 2 years' Experience OR NEBOSH / SAMTRAC & Basic ISO14001:2015/ Basic Environmental Awareness (Introduction and Implementations to ISO14001:2015) + 4 years' Experience. Register with SACPCMP.
Contractor Environmental Liaison Officer/Environmental Officer	Authorised project	JW EMP and Project Specific approved EMP /Directives/Environmental Authorisation/GA/WUL	National Diploma in Environmental Management/ + 3 years' Experience. BA/BSc Environmental Management + 3 years' experience. The recommended and/or market related minimum Salary/wages for ELO/EO should be **R17 000.00.**

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Environmental Representative/Environmental Rep	Unauthorised Project	JW EMP	Must hold a Senior Certificate (Matric) and one of the following qualifications. National Diploma in Environmental Management/ BA/BSc Environmental Management or Science/ISO 14001:2015(Introduction; Implementation and Auditing/Certificate in Environmental law/National Certificate in Environmental Management. The recommended and/or market related minimum salary/wages for Environmental Representative should be **R10 000.00.**
Consultant Environmental Control Office	Authorised project (as and when required)	JW EMP and Project Specific approved EMP /Directives/Environmental Authorisation/GA/WUL	Reputable Environmental Consulting Company National Diploma or BA/BSc Environmental Science or Management + 3 years' experience as an independent ECO/Consultant
Landscaping Specialist	Unauthorised and Authorised project	JW EMP and Project Specific approved EMP /Directives/Environmental Authorisation/GA/WUL	Reputable Environmental Consulting firm /Landscaping Company.

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			Landscaping Specialist should at least have BA/BSc Honours Degree or 4-year Degree in Natural Sciences/Ecological. - The Landscaping Specialist must at least be registered with South African Council for Natural Scientific Professions (SACNASP) as a Professional Natural Scientist (Copy of SACNASP Certificate must be submitted). - Specialist should at least have a minimum of five (5) years working experience as landscaping Specialist (See Table).

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4.3 The Contractor shall:

- Be bound to conform to the EMP conditions through his/her contract with Johannesburg Water, and is responsible for ensuring that he adheres to all the conditions of the EMP.
- Thoroughly familiarise with the EMP requirements before construction begins and must request clarification on any aspect of these documents, should they be unclear.
- Be responsible for mitigation and rehabilitating all environmental damage at his/her expense.
- Ensure adherence to, and implementation of, the environmental management specifications.
- Ensure that environmental damage, whether intentional or unintentional, is prevented in the first instance, mitigated and rehabilitated, and must adopt a proactive approach followed by a reactive approach.
- Ensures identification of, and compliance with, all environmental laws, all by laws and regulations.
- Ensure that any instructions (whether verbal or written) issued by the site manager, project manager, site engineer or EO, in terms of the EMP is adhered to.
- Ensure that an environmental compliance report is tabled at each site meeting, which must document all incidents, complaints, and non-compliances, and their close out progress, which has occurred during the period before the site meeting.
- Provide a photographic report to JW upon request showing close out of identified issues.
- Provide any project or compliance information that may be requested by JW in any format as requested.
- Ensure that proposed site camp areas are approved by JW environmental section prior to establishment.
- Ensure compliance with the EMP conditions even if there will be no site camps or the project is an emergency or subject to Directives.
- Take comprehensive site photographs for before, during and after construction.
- Ensure that each individual resident/landowner/stakeholder requirement is documented, pertaining to the area to be disturbed, special features, vegetation to be disturbed, rehabilitation requirements (contractors must state to residents/stakeholders that indigenous vegetation species will be put

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back, however, should residents/stakeholder require non-indigenous species to be replaced, these are to be documented before being affected) prior to any disturbance.

- Provide a detailed, site-specific method statement for rehabilitation, which must be approved by JW Engineer and EO.
- Ensure that a report is tabled at each site meeting, which will document all incidents that have occurred during the period before the site meeting.
- Ensure that incidents register is kept in the site office.
- Ensure that a register of all public complaints is maintained.
- Ensure that all employees, including those of sub-contractors receive Environmental Induction before the commencement of construction in order that they can constructively contribute towards the successful implementation of the EMP (i.e., ensure their staff are appropriately trained as to the environmental obligations).
- Ensure that all disturbed areas are rehabilitated and at least 85% healthy grass/ground cover has established, that rehabilitation is maintained, the sites are free of erosion, waste and pollution of any kind including rubble and spills, and free of weeds and alien invasive species.
- Appoint an Environmental Liaison Officer (ELO) prior Construction for Environmental Authorised Projects.
- Appoint SHE Officer prior Construction for unauthorized projects i.e., the SHE Officer with Environmental Management experience or be trained on Environmental legislation.
- Provide accurate and factual information pertaining to the projects, communications, and discussions at all times.
- Is responsible for NEMA Duty of Care, and Polluter pays principle.

4.4 Environmental Liaison Officer (ELO)/ SHE Officer shall:

- Ensure that the project team is involved in all aspects of project planning that can influence environmental conditions on the site.
- Be permanently on site during the construction phase to oversee the Contractor's internal compliance with the EMP requirements and ensuring that the environmental specifications are adhered to.

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- Assist with day-to-day monitoring of the construction activities. Ensure that any issues raised by the EO will be routed to the SHE Officer for the contractors' attention.
- The ELO/ SHE Officer shall be permanently on site during the construction phase to oversee the Contractor's internal compliance with the EMP requirements and ensuring that the environmental specifications are adhered to.
- Be responsible for keeping detailed records of all site activities that may pertain to the environment and include all these aspects in an environmental register.
- Maintain site documentation and records related to environmental management (EMP, authorisations, permits, way-eaves, method statements, audit reports, monitoring results, receipts for waste removal, environmental file, etc.)
- The ELO/SHE Officer must keep a register of complaints from any community members on environmental issues.
- The ELO /SHE Officer will be required to keep a record of all on-site environmentally related incidents and how these incidents were dealt with.
- Ensure daily implementation of the EMP conditions, and monitoring of the contractor's compliance with EMP conditions, using checklists and visual inspections.
- Provide location details for possible site camp locations to JW environmental section and await approval from this section before establishing.
- Inform JW environmental section when actual work is about to commence.
- Inform JW environmental section of pending completion activities and intention to de-establish, prior.
- Ensure proper rehabilitation is undertaken before site closure.

4.5 Resident Engineer (RE)/ Site Agent shall:

- Liaise with the Contractor and Environmental Officer (EO) on environmental matters, as well as any pertinent engineering matters where these may have environmental consequences.
- Oversee the general compliance of the Contractor with the EMP and other pertinent site specifications.

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- Familiarise him/herself with the EMP specifications and further monitor the Contractor's compliance with the Environmental Specifications daily through the Site Diary and enforce compliance.
- Ensure that Monthly Audits reach the contractor before Monthly Progress Meeting.
- Ensure proper rehabilitation is undertaken before site closure.

4.6 Project Engineer /Inspectors (PE/PI) shall:

- Ensure that there is a sufficient budget for complying with all EMP conditions at the tender stage.
- Ensure sufficient budget is provided for rehabilitation/ Reinstatement.
- Ensure proper rehabilitation is undertaken before site closure.
- Ensure of all specifications and legal constraints specifically with regards to the environment are highlighted to the Contractor(s) so that they are aware of these.
- Ensure that Contractor(s) are made aware of all stipulations within the EMP.
- Ensure that the EMP is correctly implemented throughout the project by means of site inspections and meetings. This will be documented as part of the site meeting minutes.
- Be fully conversant with the EIA for the project, the EMP, the conditions of the Environmental Authorisation (if applicable), and all relevant environmental legislation.
- Ensure compliance monitoring of contractors on a day-to-day basis.
- Ensure adherence and implementation of the tender requirements.
- Ensure reference of specific non-compliance/non-conformance issues to the responsible units and/or contractors.

4.7 Environmental Officers shall:

- Be responsible for informing the contractors of any decisions that are taken concerning environmental management during the project phase.
- This would also include informing the contractors of the necessary corrective actions to be taken, issuing stop work orders and rehabilitation and remediation instructions if necessary.
- Liaise with environmental authorities where necessary.
- Review all the environmental documents submitted by the Contractor, including sign off.

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- Review all the environmental documents from the Contractor, including sign off.
- Conduct environmental monthly audits of all contractors' work on site where necessary
- Maintain site documentation of related to environmental management (EMP, Method statements, audit reports, monitoring results, receipts of waste removal etc.). Documents to be maintained on the relevant site Documents Control Systems.
- Inspect and report on environmental incidents and check corrective actions.
- Conduct environmental incidents enquiries.
- Review and sign off method statements prepared by Contractors.
- Ensure that an environmental compliance monitoring strategy/framework is implemented.

4.8 Environmental Control Officer (ECO)

The role of the ECO shall be to:

- Act as site 'custodian' for the implementation, integration, and maintenance of the EMPr in accordance with the contractual requirements.
- Ensure successful implementation of the EMPr; and
- Ensure that the Contractor, his employees and/or Subcontractors receive the appropriate environmental awareness training prior to commencing activities.

The responsibilities of the ECO will be to:

- Liaise with the JW Environmental Section and Project Engineer on the level of compliance with the EMPr achieved by the Contractor on a regular basis for the duration of the contract.
- Advise the Project Engineer on the interpretation and enforcement of the Environmental Specifications (ES), including evaluation of non-compliances.
- Enforce compliance with the EA and EMP through audit report and checklist
- Supply environmental information as and when required.
- Review and approve Method Statements produced by the Contractor, in conjunction with the PM and EO.
- Monitor any basic physical changes to the environment because of the construction works according to an audit schedule.

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- Attend regular site meetings and project steering committee meetings.
- Undertake regular monthly audits of the construction works and to generate monthly audit reports. These reports are to be forwarded to the JW EO who will communicate the results and conclusions with the principal Contractor.
- Submit audit reports to the authority as per the requirement of issued Environmental Authorisation.
- Communicate frequently and openly with the Contractor and the Project Engineer to ensure effective, proactive environmental management, with the overall objective of preventing or reducing negative environmental impacts and/or enhancing positive environmental impacts.
- Advise the Project Engineer on remedial actions for the protection of the environment in the event of any accidents or emergencies during construction, and to advise on appropriate clean-up activities.
- Review complaints received and made instructions as necessary; and
- Identify and make recommendations for minor amendments to the EMPr as and when required.

4.9 Environmental Representative (Environmental Rep) shall:

- Review the effectiveness of environmental measures in the workspace/construction environment for which he/she was appointed.
- Identify potential impacts in the workplace.
- Investigate environmental incidents and identify root causes.
- Investigate Environmental Complaints.
- Conduct Awareness training.
- Participate in Environmental inspections.
- Ensure compliance with JW EMP and other environmental management related legislations.
- Ensure Proper Rehabilitation is conducted.
- Attend site SHE meetings where Environmental issues are addressed.
- Guide Construction crew/team on environmental requirements as per JW EMP.
- Assist in day-to-day monitoring of construction activities.

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- Assist in implementation of ISO 14001:2015 standard.
- Assist the SHE Officer/EO with preparation of audits /inspections.

5. CONTENTS FOR CONTRACTOR'S ENVIRONMENTAL FILE

The following documents must be submitted by the contractor in the Environmental file before Construction commences on site. The file must be submitted to the Environmental Section prior construction for approval. The Contractor should achieve a minimum score of 80% for the file to be approved (**Refer to Annexure B: Environmental File Specification).**

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6. ENVIRONMENTAL SPECIFICATIONS

Table 2: Environmental Management and Mitigation Measures that must be implemented during the Design Phase and Construction Phase

Design Phase Measures						
Aspects	**ID**	**Mitigation Measure/Procedure**	**Responsible**	**Implementation Timeframe**	**Monitoring Methods**	**Performance indicators**
Project Planning/Design	**1**	• Proposed project is submitted to Environmental Section for screening (Project scope/layout/Maps), • CAPEX and Ops must ensure that there is budget allocated for environmental management throughout the project life cycle i.e., planned project and Directives.	Johannesburg Water (CAPEX/Ops)	Before project commences	• Screening report • Tender document	Keep the records of the project screening report and scope of work as per Directives
Authorisation	**2**	• Appoint Consulting Company • Ensure that all required licences and permits have been obtained before the start of construction. • Ensure that ECO and/or ELO is appointed as per the authorisation and EMP requirement during project execution (as when and required).	Johannesburg Water (CAPEX/ Environmental Section)	Before construction commences	Keep record of all permits, licences and authorisations	Keep record of all permits, licences and authorisations
Project Handover	**3**	• The scope of a project is outlined by CAPEX Engineer during the handover meeting. • Environmental Management Requirements are outlined during the handover meeting.	Johannesburg Water (CAPEX/ Environmental Section)	Before construction commences	Meeting invite EA/GA/WUL/ Screening report	Keep record of all permits, licences and authorisations
Environmental Awareness Training/Inductions	**4**	• Environmental awareness training is given to the Project Team Leaders • Environmental File Specification provided to the Contractor.	Johannesburg Water (CAPEX/ Environmental Section)	Before construction commences	Meeting invite	Meeting records

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		• JW Environmental Management Plan and other procedures are provided to the Contractor.				
Environmental File & Evaluation	**5**	• Contractor submits environmental file for approval prior work commences on site. • Construction activities/work (including site establishment) should ONLY commence when file is approved.	Appointed Contractor/Environmental Section	Before construction commences	Environmental evaluation report.	Approval/ rejection letter records
Construction Phase Measures						
Aspects	**ID**	**Mitigation Measure/Procedure**	**Responsible**	**Implementation Timeframe**	**Monitoring Methods**	**Performance indicators**
Site camp establishment	**1**	• Invite the Environmental Officer for the site inspection of proposed site camp prior establishment. • Submit a method statement for Site Camp establishment for approval by JW Environmental Officer/ECO prior commencement of works. • Establish a suitably fenced Site Camp at the start of the contract, which will allow for site offices, vehicle, equipment, material, and waste storage areas to be consolidated as much as possible. Locate the Site Camp at a position approved by the JW EO, at least 100m from watercourses and in an area which is not ecologically sensitive. • Provide water and/or washing facilities at the Site Camp for personnel. • Lim it construction and lay down areas to areas within the development footprint. • Ensure that environmentally friendly on-site sanitation options are selected, and these facilities are properly managed and maintained. • Designated eating areas shall be provided on site. • These eating areas shall be clearly demarcated and shall be provided with bins with lids.	All Contractors	Before commencement of Project	• Visual inspection • Site establishment checklist/Method statement	Method statements approved by CAPEX and the Environmental Officer • Position of Site Camp approved by ECO • Security and access to Site Camp controlled • Clear demarcation of no-go areas as agreed with JW EO. • Detailed site layout plan

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		• Staff will be prohibited from consuming meals anywhere other than at these eating areas and that noise is limited. • All eating areas shall include provision for a water and smoking area.				• Environmental file approval letter.
Environmental Awareness Training	**2**	• Provide environmental awareness training to all personnel on site at the start of their employment. Training should include discussion of: • Potential impact of construction waste and activities on the environment. • Suitable disposal of construction waste and litter. • Key measures in the EMPr relevant to worker's activities. • How incidences and suggestions for improvement can be reported. • Ensure that all attendees remain for the duration of the training and on completion sign an attendance register that clearly indicates participants' names.	All Contractors	• Before workers start working onsite • Before new activities are undertaken	• Check training attendance register • Observe whether activities are executed in line with EMPr requirements	• Proportion of workers that completed. • Environmental training Compliance of workers with EMP
Plant Search and Rescue/Vegetation clearing	**3**	• From information gathered during the plant marking exercise, establish the size. • Requirements for the plant rescue team workforce, and the methodology to be employed during the rescue to maximise the likelihood of success; Document and motivate which species found on site are considered to be conservation worthy. • Follow a multi-pronged approach to maximise the likelihood of success wherever feasible. In addition to transplanting of whole plants, seed can be collected and sown in situ in suitable habitats and/or in an off-site nursery. • Any plants not suitable for transplantation must be considered for transplanting to existing conservation	All Contractors	Before commencement of activities	Visual Inspection/ inspection by Botanist/Ecologist	• Incidents of harm coming to fauna/ flora. • Number of incidents of disturbance of vegetation outside construction site boundary; and

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		areas nearby. This could involve growing these plants on in an off-site nursery for a period of time. • Depending on the conservation worthy species found, the location of suitable existing conservation areas nearby and the location of the off-site nursery, the most appropriate plant rescue options must be detailed in the search and rescue plan, and could be a combination of the following options: • All required permits must be obtained from the appropriate authority covering plants to be affected by the plant rescue operation prior to the removal of the plants. • Demarcate the area for construction prior to each phase and prevent access by construction personnel outside of this area. • Appoint a suitably qualified botanist to undertake search and rescue of key plant species in the development footprint where necessary (Where is applicable. Clearly demarcate sensitive areas, including buffers, with appropriate signage. • Do not allow personnel to enter calcrete vegetation areas. • Do not allow personnel to pick or destroy plants outside of the construction footprint. • Limit clearing to those areas within the footprint of construction for each phase. • Restrict construction vehicles to designated roadways. • Do not allow the temporary storage of building material within sensitive areas. **Aftercare and monitoring**				• Size of area cleared relative to development footprint • Size of area disturbed outside of construction site boundary. • Areas of development footprint must be clearly demarcated

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		• Record numbers and diversity of propagated plants and the health of the same, until they can be planted out. • Aftercare of transplanted plants to be done in accordance with the plant search and rescue plan by an appropriate agent (e.g., staff from the commercial nursery or an appropriately trained onsite Contractor), including watering and alien plant control requirements. If done correctly, the frequency of input will decrease with time. • Record numbers and diversity of transplanted plants and the health of the same. • Monitoring must be undertaken as per requirements of the plant search and rescue plan approved by GDARD, including monitoring of alien plants and maintenance of a photographic record; and • Provide a detailed record (including photographic record) that indicates the success of the plant rescue operation. Records of corrective action taken to improve management of transplanted plants, where relevant, must also be completed. **Applicable Legislation** • National Environmental Management Act: Biodiversity Act (Act 10 of 2004) including Threatened or Protected Species Regulations. • National Environmental Management Act (Act 107 of 1998). • Gauteng Nature Conservation Bill, 2014/Transvaal Nature Conservation Ordinance 12 of 1983; and • National Forests Act (Act 30 of 1998).				

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Excavation	**4**	• The process of excavation and back filling must be carried out as a sequential process following one another as quickly as possible. • Excavations must only remain open for a minimum period of time and during this time they must be clearly demarcated. If excavations place the public at risk these sites must be fenced. • Where possible, close excavations immediately after pipe is laid. • The residents directly affected by open trenches must be notified of the dangers. This will be done during the site-specific phase. • Danger tape shall not be utilised to prevent personnel from open excavations, orange nets should be used for all open excavations on site. Construction vehicles should avoid creating new roads, use existing roads. • Wet exposed surfaces using a water cart, bowser or use a biodegradable and environmentally friendly soil binder to prevent dust emissions. • Dewater excavations regularly and channel water to areas of grass cover. If dewatering is near/within a watercourse and is to be discharged to a watercourse, ensure a silt fence/net and sandbags are used to reduce silt loads. • Topsoil must be cleared (considered to be the upper 150mm of soil surface) and retained as it contains most inorganic matter and nutrients. Topsoil must be kept separate from subsoil and stored in windrows parallel to excavations. • Harvested grass should be retained and used as a mulch to combat erosion.	All Contractors	Throughout construction	Visual inspection	• Daily site inspection. • Damage to the environment (sensitive environment)

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		• Soil should be exposed for the minimum time possible once cleared of indigenous or invasive vegetation. • Avoid prolonged exposure of soils to wind and water erosion when clearing and grubbing. • The stockpiled topsoil (which will be left standing for more than 1 month) must be covered with suitable fabric, and / seeded, to prevent erosion and weed invasion. • Stockpiled topsoil must be covered with suitable fabric to prevent erosion and weed invasion. • No vehicles are allowed to access onto the stockpiles after they have been placed. • Topsoil and subsoil must be kept separate throughout construction and rehabilitation. • A marsh wire or snow netting shall be erected around the exposed excavations to warn the public. • The contractor must rip and rehabilitate temporal roads after project completion. • The Contractor shall be in possession of an emergency oil and chemical spill kit, drip trays and bioremediation substances/enzymes that must be always complete and available on site.				
Topsoil and subsoil	**5**	• The contractor should remove 150mm of topsoil and stockpile at a height of not more than 1m. • Topsoil should be temporarily stockpiled, separately from (clay) subsoil and rocky material, when areas are cleared. If mixed with clay sub-soil the usefulness of the topsoil for rehabilitation of the site will be lost. • Stockpiled topsoil should not be compacted and should be replaced as the final soil layer. No	All Contractors	During Vegetation clearance	Visual inspection	• Incident of incorrect storage and harvesting. • Manifestation of alien invasive plants. • Incident of erosions.

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		vehicles are allowed access onto the stockpiles after they have been placed. • Stockpiled soil should be protected by erosion-control berms if exposed for a period of greater than 14 days during the wet season and seeded. • Topsoil must be hydro seeded during shut down in December. • Topsoil stripped from different sites must be stockpiled separately and clearly identified as such. • Topsoil obtained from sites with different soil types must not be mixed. • Topsoil stockpiles must not be contaminated with oil, diesel, petrol, waste or any other foreign matter, which may inhibit the later growth of vegetation and micro-organisms in the soil. • Soil must not be stockpiled on drainage lines or near watercourses without prior consent from the Project Manager. • Soil should be exposed for the minimum time possible once cleared of invasive vegetation, that is the timing of clearing and grubbing should be co-ordinated as much as possible to avoid prolonged exposure of soils to wind and water erosion. • Stockpiled topsoil must be either vegetated with indigenous grasses or covered with a suitable fabric to prevent erosion and invasion by weeds. • Limited vehicular access is allowed across rocky outcrops and ridges. • All cut and fill surfaces need to be stabilized with appropriate material or measures when major civil works are complete. • Erosion and donga crossings must be dealt with as river crossings. Appropriate soil erosion and control				

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		procedures must be applied to all embankments that are disturbed and destabilized as per the Authorisation • All equipment must be inspected regularly for oil or fuel leaks before it is operated. Leakages must be repaired on mobile equipment or containment trays placed underneath immobile equipment until such leakage has been repaired. • Soil contaminated with oil must be appropriately treated and disposed of at a permitted landfill site or the soil can be regenerated using bio-remediation methods. • Runoff must be reduced by channelling water into existing surface drainage system.				
Protection of archaeological and heritage resources	**6**	• Alert the construction workforce of the potential existence of artefacts at the site. • Empower staff to stop works on (chance) discovery of artefacts at the site. • Cease construction on (chance) discovery of archaeological sites of heritage importance or redirect machinery away from finds until an archaeologist is able to make a site inspection and establish the importance of the find and make recommendations for preservation and/or record keeping. • Report the presence of graves or human remains, fragments of fossil bone, ostrich egg and stone fragments to HWC. • Obtain a permit for the removal of artefacts from the site if any are discovered during construction.	All Contractors/Johannesburg Water	• Before Construction commences • During earthworks	Visual inspection	• Discovery of possible archaeological material • Rescue and reporting of identified material when discovered
Protection of paleontological resources	**7**	• Identify a stand-by palaeontologist to inspect fossils if they are discovered during construction activities.	Johannesburg Water	Prior commencement	Visual inspection	• Discovery of possible

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		• Empower staff to stop works on (chance) discovery of fossils at the site. • Alert the construction workforce of the potential existence of fossils at the site. • Cease construction on (chance) discovery of fossils and artefacts of paleontological importance or direct machinery away from finds until the identified palaeontologist can make a site inspection and establish the importance of the find and make recommendations for preservation, collection or record keeping.	All Contractors	During earthworks		archaeological material. • Rescue and reporting of identified material when discovered.
Concrete / cement Work/Batching plant	**8**	• Use Ready-Mix concrete rather than batching where possible. • Ensure that no cement truck delivery chutes are cleaned on site. Cleaning operations are to take place off site at a location where wastewater can be disposed of in the correct manner. If this is not possible a suitable washing facility is to be developed on site in consultation with the ECO. • Concrete must be mixed only in an area demarcated for this purpose, ideally on an impervious surface (e.g., cement mixing pit). • Batching operations to take place in a designated area, which will be kept clean at all times. • All concrete spilled outside this area, must be promptly removed by the Contractor and taken to a permitted waste disposal site. • After all concrete mixing is complete; all waste concrete must be removed from the batching area and disposed of at an approved dumpsite. • Ensure separation of clean and dirty water from batching plant.	All Contractors	Throughout construction	Visual inspection and JW EO/ECO approval.	• Number of incidents of batching outside works footprint. • Contamination of water and soil; and • Visible litter / waste on site.

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		• Storm water must not be allowed to flow through the batching area. Water laden with cement must be collected in a retention area for evaporation and not allowed to escape the batching area. • Operators must wear suitable safety clothing. • Wastewater from batching operations to be suitably disposed of. • Waste concrete and cement sludge to be removed on a regular basis (to prevent overflowing) and to be disposed of at a suitable facility. • Unused cement bags will be stored in an area not exposed to the weather and packed neatly to prevent hardening or leakage of cement. • Used cement bags will be stored to prevent windblown dust and potential water contamination. Used bags will be disposed of adequately at a licenced waste disposal facility. • Limit concrete batching to single sites where possible. • Concrete transportation will not result in spillage. • Cleaning of equipment and flushing of mixers will not result in pollution, with all contaminated wash water entering the wastewater collection system. • To prevent spillage onto roads, ready mix trucks will rinse off the delivery shoot into a suitable sump prior to leaving the site. The Contractor shall ensure such designated concrete wash bay area's/ sumps are created and that all concrete trucks delivering concrete to site first empty and clean their shoots at this point before leaving the site. The dried waste product shall be handled as construction rubble.				

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		• Suitable screening and containment will be in place to prevent windblown contamination from cement storage, mixing, loading and batching operations. • All contaminated water and fines from exposed aggregate finishes will be collected and stored in sumps and will be adequately disposed of. • All visible remains of excess concrete will be physically removed on completion of the plastering or concrete pouring and disposed of in an acceptable manner. • Any spilled concrete to be cleaned up immediately. • In practice all wastes arising from construction activities are to be handled; transported and disposed of in accordance with the relevant regulations. All efforts should be made to minimise, reclaim or recycle waste, and failing that, dispose of it in a manner licensed by the government for that purpose.				
Water Management	**9**	• Con serve water wherever possible (e.g., ensure that areas are not watered excessively, and all leaking pipes are replaced and repaired immediately). • Adequate erosion, runoff and sedimentation prevention, control and mitigation measures must be instituted at all sensitive areas, such as embankments, slopes, river crossings/watercourses/drainage lines, wetlands, when excavations or disturbance occurs within these areas, within the buffers, beds, and banks. • These control measures must include use of silt fences/traps, sandbags, retention of vegetation, berms, immediate replacement of vegetation. Additionally, reno mattresses, riprap, stone pitching,	All Contractors	Throughout construction/post construction	Visual inspection	• Incidence of storm water contamination. • Visible leaks/ water wastage. • And Visible surface erosion.

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		gabions, use of geotextiles) e.g., biojute must be used at the direction of the JW Engineer. • Adequate sedimentation control measures must be instituted at any river crossings when excavations or disturbance of a riverbanks or riverbeds takes place. • Adequate sedimentation control measures must be implemented where excavations or disturbance of drainage lines of a wetland may take place. • All fuel, chemical, oil, etc. spills must be confined to areas where the drainage of water can be controlled. Use appropriate structures and methods to confine spillages such as the construction of berms and pans, or through the application of surface treatments that neutralise the toxic effects prior to the entry into a water course. • The drip trays and spill kits must be used to contain oil from spilling into the water. Ensure adequate drip trays are available. • During construction through a wetland or watercourse, most of the flow of the wetland should be allowed to pass downstream. • Vehicular traffic across wetland and watercourse areas must be avoided. • No dumping of foreign material in streams, rivers and/or wetland areas is allowed. • The wetland area and/or river must not be drained, filled or altered in any way including alteration of a bed and/or, banks, without prior consent from the DWS. The necessary licenses must be obtained in terms of Section 21 and 22 of the National Water Act, 36 of 1998 from DWS. • No fires or open flames are allowed in the vicinity of the wetland, especially during the dry season.				

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		• No swimming, washing (including vehicles and equipment), fishing or related activity is permitted in a wetland or river. • Disturbances to nesting, breeding and roaming sites of animals in or adjacent to wetland areas must be minimized. • Portable Water shall be the last resort info dust suppression on site.				
Air Pollution	**10**	• Speed limits must be implemented in all areas, including public roads and private property to limit the levels of dust pollution. • Dust must be suppressed on access roads and construction sites during dry periods by the regular application of water or a biodegradable soil stabilisation agent. Water used for this purpose must be used in quantities that must not result in the generation of run-off. • Where possible the use of potable water should be minimised for dust suppression purposes, preferably recycled or reused water. • The site-specific investigation will quantify the impact of dust on nearby wetlands, rivers and dams in terms of sedimentation. Mitigation measures identified during the site-specific study must be implemented. • The Contractor must notify the principal of all schools within 50m of the site of proposed activities. The principal must in turn ensure that children with allergies and respiratory ailments take the necessary precautionary measures during the construction period. The Contractor must ensure that construction activities do not disturb school	All Contractors	Throughout construction	Visual inspection	• Visible air pollution.

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		activities e.g., dust clouds may reduce visibility affecting sports activities. • Waste must be disposed of, as soon as possible at a municipal transfer station, skip or on a permitted landfill site. Waste must not be allowed to stand on site to decay, resulting in malodours. • Noise control measures must be implemented. All noise levels must be controlled at the source. All employees must be given the necessary ear protection gear. IAP's must be informed of the excessive noise factors. • The Contractor must inform all adjacent landowners of any after-hour construction activities and any other activity that could cause a nuisance e.g., the application of chemicals to the work surface. Normal working hours must be clearly indicated to adjacent landowners. • No loud music is allowed on site and in construction camps. • No fires are allowed if smoke from such fires will cause a nuisance to IAPs.				
Social and cultural	**11**	• Access by non-construction people onto any construction sites must be restricted. The Contractors activities and movement of staff must be restricted to designated construction areas only. • The Contractors crew must be easily identifiable due to clothing, identification cards or other methods. • Rapid migration of job seekers could lead to squatting and social conflict with resident communities and increase in social pathologies if not properly addressed. The Contractor must ensure that signs indicating the availability of jobs are installed.	All Contractors	Throughout construction	Visual inspection	• Community complaints. • Complaints register. • Daily environmental inspection

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		• Criteria for selection and appointment (by the Contractor) of construction labour must be established to allow for preferential employment of local communities. The Local Authority must be actively involved in the process of appointing temporary labourers. • Sub-Contractors and their employees must comply with all the requirements of this document and supporting documents e.g., the Contract document that applies to the Contractor. Absence of specific reference to the sub-contractor in any specification does not imply that the sub-contractor is not bound by this document. • No member of the construction workforce is allowed to wander around private property, except within the immediate surroundings of the site. • The Contractor must provide suitable sanitation facilities for site staff. Sanitation provided during the construction phase should be managed so that it does not cause environmental health problems. The use of the surrounding veld for toilet purposes is not permitted under any circumstance. • The Contractor must arrange for all his employees and those of his sub-contractors to be informed of the findings of the environmental report before the commencement of construction to ensure: • A basic understanding of the key environmental features of the work site and environments, and • Familiarity with the requirements of this document and the site-specific report. • Supervisory staff of the Contractor or his sub-contractors must not direct any person to undertake any activities which would place such person in				

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		contravention of the specifications of this document endanger his/her life or cause him/her to damage the environment. • The demand for construction materials and supplies will have an effect on the local economy. This impact can be optimised by sourcing and purchasing materials locally and regionally wherever possible, insofar as the material complies with the design specification. • The Contractor must maintain a detailed complaints register. This must be forwarded, together with solutions, to the authorities when requested.				
Aesthetics	**12**	• Scenic Quality • Damage to the natural environment must be minimized. • The contractor may not remove any trees. If trees are in the way of the pipe route or with the development sites, the contractor must inform the environmental section who will then liaise with city parks for permission or recommendation. • Trees and tall woody shrubs must be protected from damage to provide a natural visual shield. Excavated material must not be placed on such plants and movement across them must not be allowed, as far as practical. • The clearing of all sites must be kept to a minimum and surrounding vegetation must, as far as possible, be left intact as a natural shield. • No painting or marking of natural features must be allowed. • Above-ground Structures (reservoirs, water hammer tanks, valve chambers, pump stations etc.)	All Contractors	Throughout construction	• Visual inspection. • Wayleaves	• Daily inspection • Environmental incident.

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		• All above ground structures should be located in areas where the visual impact from roads, houses etc. is minimised. • All above ground structures could be treated or painted to blend in with the natural environment. • Cut and fill areas, river and stream crossings and other soil stabilisation works must be constructed to blend in with the natural environment. • Natural outcrops, rocky ridges and other natural linear features must not be bisected. Vegetation on such features must, as far as possible, not be cut unless necessary for construction. • Excavated material must be flattened (not compacted) or removed from site. No heaps of spoil material must be left on site once the Contractor has moved to a new construction site. • Any complaints from IAP's regarding the appearance of the construction site must be recorded and addressed promptly by the Contractor.				
Fauna and Flora	**13**	**Flora** • All suitable and rare flora and seeds must be rescued and removed from the site. They must be suitably stored, for future use in rehabilitation. • The felling and/or cutting of trees and clearing of bush must be minimised. • Bush must only be cleared to provide essential access for construction purposes. • The spread of alien vegetation must be minimized. • Any incident of unauthorised removal of plant material, as well as accidental damage to priority plants, must be documented by the Contractor. • Woody vegetative matter stripped during construction must either be spread randomly	All Contractors	Throughout construction	• Visual inspection • Wayleave from City Parks. • Biodiversity permit from Gauteng Department of Rural and Development	• Environmental incident register • Daily inspection • Number of environmental incidents. • Fauna and flora removal and relocation register

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		throughout the surrounding veld to provide biomass for other micro-organisms and habitats for small mammals and birds, or it may be stockpiled for later redistribution over the reinstated top soiled surface. No vegetative matter must be burnt or removed for firewood other than those removed during the grubbing and clearing phase. Such vegetation can be made available to the local inhabitants to be used as firewood. • No tree outside the footprint of the Works area must be damaged. **Fauna** • No species of animal may be poached, snared, hunted, captured, or wilfully damaged or destroyed. • Snakes and other reptiles that may be encountered on the construction site must not be killed unless the animal endangers the life of an employee. • Anthills and/or termite nests that occur must not be disturbed unless it is unavoidable for construction purposes. • Disturbances to nesting sites of birds must be minimized. • The Contractor must ensure that the work site is kept clean and free from rubbish, which could attract pests.				
Infrastructure	**14**	• The relevant authorities must be notified of any interruptions of services, especially the Local Municipality, National Road Agency, Transnet, TELKOM, and ESKOM. In addition, care must be taken to avoid damaging major and minor pipelines and other services. • The integrity of property fences must be maintained.	All Contractors	Throughout construction	• Visual inspection • Wayleaves from different entities.	• Incident register. • Permit/ Way-leave register • Complaints register.

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		• No telephone lines must be dropped during the construction operations, except where prior agreement by relevant parties is obtained. All crossings must be protected, raised, or relocated as necessary. • All complaints and/or problems related to impacts on man-made facilities and activities must be promptly addressed by the Contractor and documented. • Proper storage facilities should be provided for the storage of oils, grease, fuels, chemicals, and hazardous materials. • The Contractor must ensure that accidental spillage does not pollute soil and water resources. • Fuel stock reconciliation must be done on all underground tanks to ensure no loss of oil, which could pollute groundwater resources. • Cement must be stored and mixed on an impermeable surface. • The Contractor shall ensure that existing services (e.g., roads, pipelines, and power lines and telephone services) are not damaged or disrupted unless required by the contract and with the permission of the RE. • The Contractor shall be responsible for the repair and reinstatement of any existing infrastructure that is damaged or services which are interrupted. • A time limit for the repairs may be stipulated by the RE in consultation with the Contractor.				
Blasting	**15**	• Blasting must not endanger public or private property. • Noise mufflers and/or soft explosives must be used to minimize the impact on animals.	All Contractors	Throughout construction	Visual inspection/ Engineer report	• Incident register. • Complaints register.

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		• All the provisions of the Explosives Act, 26 of 1956 and the Minerals Act, 50 of 1991 must be complied with. • The Contractor must take measures to limit fly rock. • Certificate of competence. In file • Blasting permit must be obtained from the South African police station issued in terms of section 9 of explosive Act, Act 26 of 1956) prior blasting. • Method statement for drilling and blasting (NB: Submitted for acceptance before any works) in file • Provide the MSDS's for the chemicals are to be used. • Proof of notification to the affected community. • The Appropriate PPE.				• Permit register.
Workshops, storage areas and materials handling	**16**	• These areas shall be chosen to cause the least impact on the biophysical and social elements of the area. • The siting of workshops, maintenance and refuelling sites and materials storage areas shall not be in the vicinity of sensitive sites e.g., wetlands, cultivated fields or drainage lines, or where local landowners can be disturbed. • Storm water shall be diverted around the storage area. Storm water falling on the storage area shall be discharged if it meets the required water quality standards. • Proper storage facilities, placed on an impermeable surface, shall be provided for the storage of oils, grease, fuels, chemicals, and other hazardous materials to be used during the construction phase of the project. If fuel is required on site, it shall be stored in a secure area in a steel tank supplied and	All Contractors	Throughout Construction	• Visual inspection • Method statement for handling hazardous substances. • MSDS	• Hazardous substances register. • MSDS file • Spill register • Incident register.

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		maintained by the fuel suppliers. Leakage of fuel shall be avoided. • An adequate bund wall, 110% of volume, shall be provided for fuel and diesel areas to accommodate any spillage or overflow from these substances. The area inside the bund wall shall be lined with an impervious lining to prevent infiltration of the fuel into the soil. • In addition, hazard signs indicating the nature of the stored materials shall be displayed on the storage facility or container and Material Safety Data Sheets (MSDS's) will be made available for all hazardous chemicals. Before containers or storage facilities are erected, emergency procedures in the event of misuse or spillage that may negatively affect an individual or the environment will be in place. • The storage facilities (including any tanks) shall be surrounded by a bund wall, in order to ensure that accidental spillage does not pollute local soil or water resources. • The storage areas shall not be utilised for accommodation purposes and shall be access controlled. • The storage area shall be kept tidy, and the area shall be rehabilitated after use. • An inventory of any hazardous chemicals/substances (including that within equipment) kept on site, along with a description of possible ill effects and treatment of health-related afflictions resulting from accidents, shall be kept in the storage area as well as by the appropriate manager. These areas shall be securely fenced.				

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		• Gas welding cylinders and LPG cylinders shall be stored in a secure, well-ventilated area. • A notice board with the contact details of the responsible party shall be displayed at the gate to the storage area. • The contractor shall ensure that any delivery drivers are informed of all procedures and restrictions required to comply with the EMP. Someone with an adequate understanding of the CEMP shall supervise drivers during delivery and off-loading. • All vehicles and machinery will be inspected for any leaks or malfunctions regularly. Vehicle servicing or repairs is prohibited from site, unless in an emergency. • Drip trays shall be inspected and emptied daily and serviced when necessary. Drip trays shall be closely monitored during rain events to ensure that they do not overflow. The contents must be disposed of at a recognised site. • All repairs done on machinery using hydrocarbons as fuels or lubricants shall have a drip tray placed strategically to avoid incidental spillage. • Workers shall be made aware of the health risks associated with any hazardous substances used (e.g., smoking near refuelling depots), and shall be provided with appropriate protective clothing / equipment in case of spillages or accidents. • Cement and other potential environmental pollutants shall be stored and mixed on plastic sheeting or ready-mix trucks shall be used. There shall be no opportunity for environmental contamination.				

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		• Workshop areas shall be monitored for oil and fuel spills and such spills shall be cleaned and remediate to the satisfaction of the EO. • The Contractor shall be in possession of an emergency spill kit that must be always complete and available on site.				
Waste Management	**17**	Methods for waste management and waste minimisation shall be implemented from the outset of the contract as per the Waste Management Plan to be submitted to Client. All personnel shall be instructed to dispose of all waste in the proper manner. A waste avoidance and minimisation approach will be encouraged for the duration of the project. The following steps in order will be applied. • Prevention – avoid and minimise waste • Recycle – reuse and recover all general waste • Treat – treatment to reduce toxicity reduce waste quantities • Dispose – waste removal into a registered landfill facility **Solid waste** Waste with the potential for market re-use will be stored in separate containers, this includes, scrap metal, used tyres and paper. This waste will be recycled wherever possible. Solid waste shall be temporarily stored in tip – poof metal drums or waste skips at an approved area on site for collection and disposal. This area shall be away from drainage lines or water courses. • All general waste drums or skips will be appropriately labelled GENERAL WASTE	All Contractors	Throughout Construction	• Visual inspection/Environmental inspection checklist. • Legal Documents: Transport certificate obtained from GDARD for transporting general or hazardous waste. • Transport certificate obtained from City of Johannesburg for transporting general waste within COJ. • Waste manifest/	• Littering • Soil contamination • Water pollution.

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		• A refuse control system shall be established for the collection and removal of refuse to the satisfaction of Client and ECO. • No waste shall be burned at the site offices or anywhere else on the site. • All building rubble shall be a) removed from the site and disposed of at an appropriate dumping site, or b) temporarily stored in a clearly demarcated area on site for future use. • All waste shall be disposed at an appropriate waste disposal facility. **Litter** • No littering by construction workers shall be allowed. During the construction period, the facilities shall be maintained in a neat and tidy condition and the site shall be kept free of litter. • Measures shall be taken to reduce the potential for litter and negligent behaviour regarding the disposal of all refuse. • Littering, discarding, or burying of any materials shall not be allowed on site. **Hazardous waste** • Hazardous waste shall be temporarily stored in tip – poof metal drums or waste skips at an approved area on site for collection and disposal. This area shall be away from drainage lines or water courses. • All hazardous waste drums or skips will be appropriately labelled.			waste disposal certificate/ weighbridge slip.	

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		• Hazardous waste must not be temporary stored on site for a period exceeding 90 days as per the National Environmental Management Waste Act (Act 59 of 2008) as amended in 2014) (Schedule 19 (2)). **HAZARDOUS WASTE.** • Hazardous waste such as bitumen, tar and oil shall be disposed of at a registered waste disposal facility. Special care shall be taken to avoid spillage of tar products such as tar prime or pre-coating fluid to avoid water-soluble phenols from entering the ground or contaminating water. • All used filter materials shall be stored in a secure bin for disposal off site. Any contaminated soil shall be removed and replaced with clean soil. Soil contaminated by oils and lubricants shall be collected and disposed of at a facility designated by the local authority to accept contaminated materials. • Used oil, lubricants, and cleaning materials from the maintenance of vehicles and machinery shall be collected in a holding tank and returned to the supplier. Water and oil shall be separated in an oil trap. Oils collected in this manner shall be retained in a safe holding tank and removed from site by a specialist oil recycling company for disposal at an approved hazardous waste disposal site. Oil collected by a mobile servicing unit shall be stored in the service unit's sludge tank and discharged into the safe holding tank for collection by the specialist oil recycling company. • Sludge should be managed in accordance with the Sludge Guideline 2010.				

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		• Sludge should be kept only at the drying bed and no sludge should be stored at a permeable ground or natural ground. • Hazardous waste shall be disposed of at a registered hazardous waste disposal site, disposal certificates shall be kept in the site file for record. **Medical Waste** • All medical waste will be contained in the special bins provided. All sharp needles must be separated from other medical waste, • All outdated and disused medicines will be disposed of as a hazardous medical waste or returned to the supplier for disposal. (Tablets and syrups will be crushed and/or dissolved before disposal as hazardous waste), • Medical waste used on personnel coming for treatment at the clinic are to be placed on a demarcated container storage room, • The Occupational Health Nurse (OHN) will notify a service provider for removal of the medical waste prior exceeding 90 days. • The service provider to provide Waste Manifest as well as the Safe Disposal Certificate, to the OHN who will maintain the copies of the waste manifest and safe disposal certificate. • The OHN will arrange for an approved hazardous waste disposal company to collect and dispose of this medical waste. The OHN is responsible for and authorised to keep all records in connection herewith (disposal certificates).				

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Ablution facilities	**18**	• Provide ablution facilities (i.e., chemical toilets) for all site staff at a ratio of 1 toilet per 15 workers (absolute minimum 1:25). • Secure all temporary/portable toilets to the ground within the Site Camp to the satisfaction of JW EO/ECO to prevent them toppling due to wind or any other cause. • Maintain toilets in a hygienic state (i.e., toilet dispensers to be provided, toilets to be cleaned and serviced regularly (by registered appropriate waste contractor), and toilets to be emptied before long weekends and builders' holidays). • Remove/ appoint an appropriate supplier to remove accumulations of chemicals and treated sewage from the site and dispose of at an approved waste disposal site or sewage plant. • Ensure that no spillages occur when the toilets are cleaned or emptied. Repeated incidents of spillage of chemicals and or waste (i.e., more than one incident), will require toilets to be placed on a solid base with a sump. • Ablution facilities must be located at least 50m from any watercourse. • Ablution facilities shall be provided on site. • The positioning of the ablution facilities shall be done in consultation with Client and shall be placed so that it cannot contaminate the natural streams and rivers. One toilet shall be provided per 10 staff members on site. Toilets shall be positioned within walking distance of wherever employees are employed on the site. Toilets shall be provided with locks and doors shall be secured to prevent the toilets from blowing over.	All Contractors	Throughout construction	• Visual inspection • Records of waste manifest/disposal certificates/ weighbridge slip	• Incidence of staff not using Facilities • Incidence of pollution

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		• The toilets shall be placed outside of areas susceptible to flooding. • Chemical toilets shall be serviced regularly by an authorised service provider and removed to a registered wastewater treatment works and disposal certificates shall be obtained from the waste disposal facility for each disposal and retained on site. • Polluted run-off must be discharged in the local sewerage main and not overland or into public streams. In instances where a sewerage main is not available, polluted run-off will be collected in sub-surface tanks and a reputable effluent removal contractor will be contracted to dispose of the waste in an environmentally acceptable manner. Official documentation shall be obtained from the waste disposal facility for each disposal and retained on site. • Toilets situated close to the site boundaries or within sight of residential areas shall be hidden behind screens or other cover as approved by the Engineer. • Discharge of waste from toilets into the environment and burial of waste is strictly prohibited. • Only flushable toilets should be utilised on site. • If the Ablution facilities are to be connected to the Municipal sewer line, method statement and a letter for municipal tax and rates should be submitted to JW Environmental section and responsible Depot for approval. • A letter or agreement for disposing waste must be obtained from the applicable WWTW; this must be provided by service provider. Waste manifests, disposal certificates and service certificates are				

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		required; these must be provided by service provider. • The contractor shall not appoint service providers who do not have registration certificates with GDARD and CoJ for transporting hazardous (and general waste), and copies of permits for landfills, and agreement letter from WWTW, to be used for disposals. The contractors themselves are encouraged to register as general and hazardous waste transporters, and open accounts with Pikitup, so disposal slips may be obtained.				
Access road and traffic control	**19**	**Access Roads** • The Contractor and the affected landowner must collaborate on the planning and construction of new access routes and the repair or upgrading of existing routes. • Access to the site must be controlled such that only vehicles and persons directly associated with the work gains access to the site. • Temporary access roads must not be opened until required and must be restored to its former state as soon as the road is no longer needed**.** **Traffic Control** • All reasonable precautions must be taken during construction to avoid severely interrupting the traffic flow on existing roads, especially during peak periods. • Before any work can start the Local Traffic, Department must be consulted about measures to be taken regarding pedestrian and vehicular traffic control and obtain proper road signage's	All Contractors	Throughout construction	• Method statement for access road and traffic control. • Wayleave	• Daily Inspection checklist. • Environmental incident. • Incident register.

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Electrical	**20**	• Measures must be taken during thunderstorms to protect workers and equipment from lightning strikes. • All tall structures must be properly earthed and protected against lightning strikes.	All Contractors	Throughout construction	• Permit • OHS approval letter • Wayleave	• Approval letter • Electrical certificate
Development Footprint	**21**	• The development footprints and disturbed areas surrounding the proposed project infrastructure should be kept at minimum as possible and the areas cleared of natural vegetation and topsoil must be kept to a minimum. • The extent of all development footprint areas and permanent/ temporary structures must be limited to what is essential. • As far as possible, existing roads are to be utilised, to limit cumulative impacts from roads and traffic. • The height of any temporary structures such as topsoil stockpiles should be kept as low as possible below 1m.	All Contractors	Throughout construction	• Agreement letter. • Wayleave	• Incident register. • Complaints register.
Fire Prevention	**22**	• The Contractor must take all the necessary precautions to protect the materials on site and to avoid veld fires. • No fires or open flames are allowed on site unless directly used for construction purposes, • Review all SANS standards relating to fire precautions and fire control namely, SANS 0131-3 Section 8 and SANS 089-1 or as amended. • The Contractor must have fire-fighting equipment and a first aid box available on site and on all vehicles working on site. • All waste bins must be kept away from fuel tank installations.	All Contractors	Throughout construction	• Visual inspection • Emergency Response Plan.	• Fire extinguisher inspection checklist. • Incident register • Mock drill report.

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		• All fuel tanks must be installed above ground, depending on the volume of stored fuel, for easy detection of fuel leaks. • Any welding or other sources of heating of materials must be done in a controlled environment, wherever possible and under appropriate supervision, in such a manner as to minimise the risk of veld fires and/or injury to staff. • Fires lit for comfort (warmth) must be actively discouraged by the Contractor, due to the risk of veld fires and the risk to adjacent properties. Also, no waste material must be burnt.				
Noise Pollution	**23**	• Temporary noise pollution due to construction works should be controlled by proper maintenance of equipment and vehicles and tuning of engines and mufflers. Construction works should be completed in as short a period as possible by assigning qualified engineers and foremen. • It is the responsibility of the Contractor to monitor for the mitigation of such impacts. Noise problems should be reduced to normally acceptable levels by incorporating low-noise equipment in the design and/or locating such mechanical equipment in properly acoustically lined buildings or enclosures. In the presence of adequate buffer zones between the facility and residential areas, noise control measures must be minimized.	All Contractors	Throughout Construction	Random noise measurements	• Results of random noise measurements • Number of registered complaints
Complaints	**24**	Maintain complaints register for all complaints. The register must list: • Complainant name and contact details. • Date complaint was lodged. • Person who recorded the complaint. • Nature of the complaint.	All Contractors	Throughout construction	Complaints register	• Availability of register on site • Designated person to

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		• Actions taken to investigate the complaint and • outcome of the investigation. • Action taken to remedy the situation. • Date on which feedback was provided to complainant.				maintain register • Complaints logged • Complaints followed up and Closed out.
Housekeeping	**25**	• All construction and operational areas must be always kept in a neat and orderly condition. • An efficient removal system of waste and rubble must be ensured during all development phases. • All operational facilities, including vehicles, should be actively maintained. • Any areas for material storage, waste sorting and other potentially intrusive activities must be screened from view as far as considered feasible. • Regularly inspect all construction machinery and holding tanks for leaks or damages. • Place generators on drip trays. • Repair any defects as soon as possible. In the case of leaks, ensure that the leaking water or effluent is captured and not released into the environment. • Service and refuel equipment that uses hydrocarbon fuels, oils, lubricants, and other hazardous chemicals at the designated area at the Site Camp only under conditions approved by JW EO/ECO • Ensure that absorbent pads (or equivalent) and/ or drip trays are available to collect any oil, fluid, etc. in the case of a breakdown or emergency repair outside the designated area. Keep a copy of fuels and hazardous substance inventory on site.	All Contractors	Throughout	Visual inspection of site camp/ construction site	Regular inspection reports by SHE Officer and JW EO

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		• Keep spill containment and clean-up equipment at all work sites and for all polluting materials used at the site. • Prevent discharge of any hazardous substances or pollutants, such as cements, concrete, chemicals, and other contaminated wastewater and fuels into the ground, surface, or storm water systems on site. • Control litter and keep construction areas as clean and neat as possible.				
Transportation and refuelling	**26**	• Undertake regular maintenance of vehicles and machinery to identify and repair minor leaks and prevent equipment failures. • Undertake any on-site refuelling and maintenance of vehicles/machinery in designated areas. Line these areas with an impermeable surface and install oil traps. • Ensure that oils and lubricants used for maintenance of equipment in the field are correctly contained. • Use appropriately sized drip trays for all refuelling and/or repairs done on machinery – ensure these are strategically placed to capture any spillage of fuel, oil, etc. • Use drip trays under all equipment and plants that are parked overnight or for long periods. • Store and handle fuels, oils and chemicals so as to avoid the risk of spillage, i.e., in waterproof and impervious	All Contractors	Throughout Construction	Visual inspection of vehicles, barges, machinery and refuelling / maintenance areas	• Incidence of non-compliance • Incidence of leaks and spills • Cost of cleaning up spills
Safety and Security	**27**	• Do not allow any open fires on the site. • Do not allow smoking on the site except within designated areas. Suitable fire-fighting equipment must be readily available in these areas.	All Contractors	Throughout construction	• Inspect attendance register for training sessions	• Number of fire incidents

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		• Equip all fuel stores and waste storage areas with fire extinguishers. • Ensure that all personnel on site are aware of the location of fire-fighting equipment on the site and how the equipment is operated. • Suitably maintain fire-fighting equipment. • Ensure that emergency procedures (in relation to fire, spills, contamination of the ground, accidents to employees, use of hazardous substances, etc.) are established prior to commencing construction. • Make all emergency procedures available, including responsible personnel, contact details of emergency services, etc. to all the relevant personnel. Clearly demarcate emergency procedures at the relevant locations around the site. • Secure the Site Camp, particularly to restrict • Unauthorised access to fuels and other hazardous substances. • Provide suitable emergency and safety signage on site and demarcate any areas which may pose a safety risk (including hazardous substances, deep excavations, etc.). • Advise the ECO of any emergencies on site, together with a record of action taken.	All Contractors	Before and during construction	• Inspect fire extinguishers and certificates Visual inspection	• Certified extinguishers in appropriate locations Number of safety / emergency incidents.
Response to environmental pollution	**28**	• In the event of environmental pollution, e.g., through spillages, immediately stop the activity causing the problem. • Maintain relevant Material Safety Data Sheets (MSDS) at the site for all potentially hazardous substances (as defined in the regulations for hazardous chemical substances). In the event of an emergency, procedures detailed in the MSDS shall be followed. Clean up any spills immediately,	All Contractors	Throughout construction	• Maintain register of pollution events and response • Following resumption of activities, frequently	• Number of incidents • Time activities stopped • Number of recurring Incidents

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		through containment and removal of free product and appropriate disposal of contaminated soils. • Immediately remediate and rehabilitate areas in the event of a spill of an environmentally hazardous substance. • Only resume activity once the problem has been stopped or (in the case of spillages) the pollutant can be captured without reaching the environment. Repair faulty equipment as soon as possible. • Treat hydrocarbon spills, e.g., during refuelling, with adequate absorbent material, which then needs to be disposed of at a suitable landfill. • Ensure a quantity of appropriate remedial agent, capable of containing and/or remediating a hydrocarbon spill is available on site at all times in case of an emergency spill. The material shall be capable of handling a spill of at least 200l. • Report all fuel, oil or hydraulic fluid spills to the JW EO/ECO so that appropriate clean-up measures can be implemented. • Report all incidents within 24 hours to JW environmental section. • All environmental incidents must be investigated within seven (7) working days.			inspect repaired equipment to ensure proper functioning	• Availability and 66complete ness of register
Storm Water Management	**28**	**Objective** • To minimise erosion of soil from site during construction. • To minimise deposition of soil into drainage. • Minimise loss of vegetation cover due to construction related activities.	All Contractors	Throughout Construction	• Visual inspection. • Storm water management Plan. • Wayleave from JRA	• Daily inspection checklist. • Incident register.

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		Mitigation Measures • Identify and demarcate construction areas for general construction work and restrict construction activity to these areas. Prevent unnecessary destructive activity within construction areas (prevent over-excavations) • Stockpile topsoil for re-use in rehabilitation phase. Maintain stockpile shape and protect from erosion. All stockpiles must be positioned at least 50 m away from drainage lines and wetlands. • Erosion control measures: Run-off control and attenuation on slopes (sandbags, logs), silt fences, storm water channels and catch-pits, shade nets, soil binding, geofabrics, hydro seeding or mulching over cleared areas. • Control depth of excavations and stability of cut faces/sidewalls. • Compile a comprehensive storm water management plan as part of the final design of the project and implement during construction and operation.				
Indigenous Vegetation, Re-vegetation, Rehabilitation, Reinstatement	**29**	**Objective** To ensure that suitable rehabilitation and re-vegetation of disturbed areas is undertaken the following legislations are applicable: **Legislation and Standards** • Conservation of Agricultural Resources Act (Act 43 of 1983 • Environment Conservation Act (Act 73 of 1989 • National Forestry Act (Act 84 of 1998	All Contractors	Throughout Construction	• Rehabilitation Plan • JW EMP • Visual inspection • Ecologist Specialist report • Environmental Authorisation/ GA	• Daily inspection checklist. • Rehabilitation report • Waste management collection report (Waste Disposal Certificate).

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		• National Environmental Management Act 107 of 1998 and Gauteng Nature Conservation Bill, 2014. • National Environmental Management Biodiversity Act 10,2004. **Mitigation measures** In order to meet this goal, the following objective, actions, and monitoring requirements are relevant: • Disturbed areas must be rehabilitated/re-vegetated with appropriate natural vegetation and/or local seed mix. Re-use native/indigenous plant species removed from disturbance areas in the rehabilitation phase as per the re-vegetation and rehabilitation management plan. • Alien/non-native species must not be used. If these are requested/ required by stakeholders, then this must be documented by contractor. • Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved. • On-going alien plant monitoring and removal within the disturbed project footprint (where the initial clearing for construction took place) must be undertaken on all areas of natural vegetation on an annual basis. • All temporary facilities, equipment and waste materials must be removed from site and appropriately disposed of. • All temporary access road must be rehabilitated to their original condition			• Practical and completion certificate. • Community Happy Letters.	

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		• Necessary drainage works and anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion. • On-going inspection of rehabilitated areas to determine effectiveness of rehabilitation measures implemented. • On-going alien plant monitoring and removal should be undertaken as per the approved Rehabilitation/Re-vegetation plan. **Management and Mitigation Requirement** • Conduct a detailed search of at the area. As a minimum, this should take place during the spring and summer months prior to impoundment so positive identification of flowering plants can be made. This should be done taking due cognisance of specialist studies already undertaken as part of the EIA process. • Allow time for additional searches if these are deemed necessary, based on progress and diversity of plant species found. • Identify and physically mark all conservation worthy plants found on the ground; and • Capture markers and reference in a retrievable system, so that these can be located again for transplanting (e.g., using a combination of aerial photography, GPS, and GIS, as appropriate).				
Practical and Final completion inspection	**30**	• Ensure that practical inspection is conducted before the Contractor hands over the project back to JW in order to ascertain if the reinstatement or rehabilitation has been done accordingly.	CAPEX/ OHSE& DM/ All Contractors	During the final stage of project	• Meeting invite • Visual inspection	• Meeting invite • Attendance register • Snag list

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		• The snag list is to be compiled and accepted by all parties (JW CAPEX Representatives, JW environmental section as applicable, and appointed Contractor) All responsible personnel including Environmental representative sign both practical and final completion letter.				• Signed practical and final completion inspection letter.
Final close out report	**31**	• Conduct final audit on site. • EO must ensure that audit reports are signed by RE/Engineer and Contractor. • Environmental File is returned to JW, after rehabilitation has been deemed successful.	OHSE & DM	During the final stage of project.	• Final audit report. • Signing of Audit reports.	• Final Audit report. • Signed Audit report. • Environmental file.

Table 3: Environmental Management and Mitigation Measures that must be implemented during the Operational Phase

Operational Phase Measures						
Aspects	**ID**	**Mitigation Measure/Procedure**	**Responsible**	**Implementation Timeframe**	**Monitoring Methods**	**Performance indicators**
Waste Management	**1**	Sanitation Facilities • Ablution facilities shall be provided on site. • The positioning of the ablution facilities shall be done in consultation with Client and shall be placed so that it cannot contaminate the natural streams and rivers. One toilet shall be provided per 15 staff members on site. Toilets shall be positioned within walking distance of wherever employees are employed on the site. Toilets shall be provided with locks and doors shall be secured to prevent the toilets from blowing over. • The toilets shall be placed outside of areas susceptible to flooding.	Johannesburg Water	During operation and maintenance activities	• Visual inspection of Waste collection and disposal areas. • Visual inspection of site. • Check waste	• Presence of litter • Availability of waste bins and skips. • Degree to which rubbish bins and skips are filled • Total volume of general and hazardous waste storage capacity • Total volume of general and

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		• Chemical toilets shall be serviced regularly by an authorised service provider and removed to a registered wastewater treatment works and disposal certificates shall be obtained from the waste disposal facility for each disposal and retained on site. • Polluted run-off must be discharged in the local sewerage main and not overland or into public streams. In instances where a sewerage main is not available, polluted run-off will be collected in sub-surface tanks and a reputable effluent removal contractor will be contracted to dispose of the waste in an environmentally acceptable manner. Official documentation shall be obtained from the waste disposal facility for each disposal and retained on site. • Any cooking on Site shall be done on well-maintained gas cookers with fire extinguishers present. No cooking shall be permitted to occur on open fires. • Toilets situated close to the site boundaries or within sight of residential areas shall be hidden behind screens or other cover as approved by the Engineer. • No spillage shall occur when the toilets are cleaned or emptied and the contents shall be properly stored and removed from site. • Discharge of waste from toilets into the environment and burial of waste is strictly prohibited. • All building rubble and rubble from the demolished structures, solid and liquid waste must be disposed of as necessary at an appropriately licensed refuse facility. • Ensure that no refuse wastes are burnt on the premises or on surrounding premises. No fires will be allowed on site.			disposal slips. • Monitor activities against JW Waste Management Plan. • Waste Inventory Register.	hazardous waste stored on site • Degree to which different waste is separated. • Frequency of waste collection. • Total volume of recycled and reused waste.

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		Contaminated water •Workshops, refuelling depots and washing areas shall be bunded. •Any wastewater or spilled fuel collected within bunded areas around the refuelling area shall be disposed of as hazardous waste •Wastewater containing hydrocarbons, paints oil etc. shall be treated as hazardous waste				
Protection of Vegetation	**2**	• Limit the footprint of the maintenance and operational activities to the minimum to minimise environmental damage. • Designate vegetated areas outside the development footprint as "No go" areas. • Limit the off-road driving within the Johannesburg Water Sites. • Protected or endangered species of plants shall not be removed unless they are interfering with a structure. • All trees and vegetation cleared from the site shall be cut into manageable lengths. • Big trees with large root systems shall be cut manually and removed, as the use of a bulldozer will cause major damage to the soil when the root system is removed. • Stumps shall be treated with herbicide. • Protected or endangered species of plants shall not be removed unless they are interfering with a structure. • Where such species have to be removed due to interference with a structure, the necessary permission and permits shall be obtained from	Johannesburg Water	• During operation and maintenance activities/. • When is necessary?	Visual inspection	• Incidents of vegetation damage. • Number of incidents of disturbance of vegetation outside site boundary.

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		Provincial Department of Agriculture and Rural Development. • All protected species not to be removed must be clearly marked and such areas fenced off if required. • The use of herbicides shall only be allowed after a proper investigation into the necessity, the type to be used, the long-term effects and the effectiveness of the agent. • No scalping shall be allowed on any part of Johannesburg Water Sites.				
Alien invasive/weeds control	**3**	• Some of the areas of JW area are covered with moderate to very dense invasive alien shrubs and trees. Clearing of such vegetation will be necessary to gain access. However, clearing of this vegetation from the entire project area as far as possible will reduce the re-establishment rate of this vegetation over time, and will thus not only benefit the environment also put the proposed project and potential future phases of the project in the long term. • The type of invasive, however, will require regular follow-up eradication of seedlings after clearing, as extensive seedbanks of these species are present underneath present infestations. • Wood from alien vegetation can be used. However, care must be taken not to leave any of the leaf- or seed material on the site where the vegetation was cleared. Rather, identify a particular area that no longer has any indigenous vegetation, demarcate that area and dump excess material of alien species there. • Once the material is sufficiently dry, it should be burned to destroy any regenerating capacity of stems and roots as well as seeds.	Johannesburg Water	During operation and maintenance activities	• Visual inspection. • Monitoring against Vegetation Management Plan. • PCO certificate.	• Daily inspections register. • Incident register.

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		• Only registered PCO with Certificate for competency to handle the hazardous substances (e.g., Herbicides) is allowed to use herbicide. • Only environmentally friendly herbicide is allowed within JW sites. • MSDS for the herbicides must be kept in the storage area. • Method Statement for applying and handling herbicides and Risk Assessment for applying and handling herbicides. • Appropriate PPE for handling herbicides. • Herbicides stored only in a designated storage. • Empty containers of herbicides disposed of accordingly to the registered hazardous landfill site. • Proof of disposal provided to JW Environmental Section.				
Sludge Management	**4**	• The sludge must be managed according to the sludge guideline. • All agreements or Contract must be placed in the file. • The sludge must be kept on a designated bunded and concrete lined drying bed.	Johannesburg Water/Bulk Waste	During operations activities	• Visual inspection according to Sludge SOP. • Monitoring against Sludge Guideline. • Monitoring against WUL.	• Sludge test report • Complaints register. • Sludge spill register. • Environmental Officers Internal WUL Audit Report.
Workshop and storage Area	**5**	• The siting of workshops, maintenance and refuelling sites and materials storage areas shall not be in the vicinity of sensitive sites e.g., wetlands, cultivated fields or drainage lines, or where local landowners can be disturbed.	Johannesburg Water	During operations and maintenance activities	• Visual inspection • SOP for handling hazardous	• Workshop and storage register. • MSDS register. • Incident register.

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		• Storm water shall be diverted around the storage area. Storm water falling on the storage area shall be discharged if it meets the required water quality standards. • Proper storage facilities, placed on an impermeable surface, shall be provided for the storage of oils, grease, fuels, chemicals, and other hazardous materials to be used during the construction phase of the project. If fuel is required on site, it shall be stored in a secure area in a steel tank supplied and maintained by the fuel suppliers. Leakage of fuel shall be avoided. • An adequate bund walls, 110% of volume, shall be provided for fuel and diesel areas to accommodate any spillage or overflow from these substances. The area inside the bund wall shall be lined with an impervious lining to prevent infiltration of the fuel into the soil. • In addition, hazard signs indicating the nature of the stored materials shall be displayed on the storage facility or container and Material Safety Data Sheets (MSDS's) will be made available for all hazardous chemicals. Before containers or storage facilities are erected, emergency procedures in the event of misuse or spillage that may negatively affect an individual or the environment will be in place. • The storage facilities (including any tanks) shall be surrounded by a bund wall, in order to ensure that accidental spillage does not pollute local soil or water resources. • The storage areas shall not be utilised for accommodation purposes and shall be access controlled.			substances. • MSDS register	

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		• The storage area shall be kept tidy, and the area shall be rehabilitated after use. • An inventory of any hazardous chemicals/substances (including that within equipment) kept on site, along with a description of possible ill effects and treatment of health-related afflictions resulting from accidents, shall be kept in the storage area as well as by the appropriate manager. These areas shall be securely fenced. • Gas welding cylinders and LPG cylinders shall be stored in a secure, well-ventilated area. • A notice board with the contact details of the responsible party shall be displayed at the gate to the storage area. • All vehicles and machinery will be inspected for any leaks or malfunctions regularly. Vehicle servicing or repairs is prohibited from site, unless in an emergency. • Drip trays shall be inspected and emptied daily and serviced when necessary. In particular drip trays shall be closely monitored during rain events to ensure that they do not overflow. The contents must be disposed of at a recognised site. • All repairs done on machinery using hydrocarbons as fuels or lubricants shall have a drip tray placed strategically to avoid incidental spillage. • Workers shall be made aware of the health risks associated with any hazardous substances used (e.g., smoking near refuelling depots), and shall be provided with appropriate protective clothing / equipment in case of spillages or accidents. • Cement shall be mixed on a plank, mental plate or a plank only or ready-mix trucks shall be used, and				

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		other potential environmental pollutants shall be stored at the designated area. There shall be no opportunity for environmental contamination. • Workshop areas shall be monitored for oil and fuel spills and such spills shall be cleaned and remediate to the satisfaction of the EO. • The site shall be in possession of an emergency spill kit that must be complete and available at all times on site.				
Complaints	**6**	• Maintain complaints register for all complaints. The register must list: • Complainant name and contact details. • Date complaint was lodged. • Person who recorded the complaint. • Nature of the complaint. • Actions taken to investigate the complaint and outcome of the investigation. • Action taken to remedy the situation. • Date on which feedback was provided to complainant.	Johannesburg Water	During operations and maintenance activities	• Complaints register. • GDARD complaints reference number.	• Availability of register on site • Designated person to maintain register • Complaints logged • Complaints followed up and closed out.
Collection of water sample	**7**	• Water sampling shall be undertaken at the selected sampling points as per the WUL. • Any incident or non-compliance with the WUL parameters or DWS Water Quality Guidelines shall be reported accordingly and investigated • Unused sampling bottle shall be disposed of accordingly.	Johannesburg Water/CDYNA	During operation activities	• Visual inspection. • Online Lab reports	• Daily water sample report. • Incident register.
Environmental Incident reporting and Emergency Response and Preparedness	**8**	• NEMA Section 30 and 30A emergency incidents and situations must be reported to GDARD or DEA immediately after as an incident or situation occurs. NWA Section 20 emergency must be reported to DWS, mostly by Operations Department. This can be done via phone, fax, or email. JW must implement	Johannesburg Water Sites	During operation and maintenance activities.	• Visual inspection. • Flash report/ Incident	• Incident register • Bioremediation report. • Section 30A Directive.

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		measures to contain the incident or situation immediately. Thereafter the Emergency Incident Report (EIR) or Emergency Situation Report (ESR) must be submitted to the authorities ASAP. The reports must provide as much information as possible, if not; the reports can be updated later as the investigation progresses. Not reporting an incident could result in the authorities issuing a directive or a compliance notice to the responsible person. • Important Note: For Section 30A Emergency Situation, an oral or written directive must be obtained from GDARD or DEA before works can be undertaken in the watercourse to avoid undertaking listed activities without obtaining EA. • Johannesburg Water takes responsibility in order to effectively respond to emergency incidences such as fire, hydrocarbon and sewer spills or leakages, disturbance of wildlife and archaeological artefacts. The SHE Rep must conduct daily inspections to ensure that the required equipment needed to handle environmental incidents/ emergencies are readily available and in working condition. Quick response to an incident prevents escalation to an emergency:			investigation report. • Section 30A Annexure A. • JW Environmental Emergency Preparedness and Response Procedure.	• Corrective Action Plan

9. Water Management

- Water is a scarce resource and water shall be conserved wherever possible.
- Improved and protected watercourses to Class C classification which is moderately modified in terms of determined class of water resource and resource quality objectives of chapter 3 (Part 2) of National Water Act (Act 36 of 1998).
- Demand reduction/ Alternative sources.
- Building a water sensitive city.
- Well managed and maintained water infrastructure networks**.**

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Water Usage	**9.1**	• The site must be kept tidy and hygienic at all times with special reference to sanitation & water management. • Maintain a monthly water usage. • Reporting of water pipe burst and damaged meters	Johannesburg Water Sites	During operation	• Visual inspection • Meter readings	• Records of Monthly water Usage.
Reduce water demand	**9.2**	• Implement effective demand-side management practices while exploring investment into smart infrastructure and alternative supplies to increase levels of net water savings. • Establish Task Team with different law enforcement agencies to develop and implement solution for infrastructure abuse problem. • Promote the implementation of Sustainable Urban Drainage System practice.	Johannesburg Water (Network)	During operation	• Monthly Monitoring • Monthly water management report	• Records of percentage reduction on non-revenue water. • Records of Percentage reduction of Rand Water system input volume.
Incentivise water saving interventions across domestic and economic sector users.	**9.3**	• Implementation of command-and-control base mechanism that promote water saving (CoJ By-laws). • Implementation of incentives base mechanism • Develop partnerships beyond the City to encourage water savings. • Expand current CoJ drought policy to build greater resilience of the water system. • Integrate water conservation requirements in conditions of planning approval. • Develop an awareness and communications campaign using available technology.	Johannesburg Water	CoJ/Operations	• Monthly water management report	• Records of reduction in annual water consumption per capita • Water from alternative sources as % of total water supply
Rehabilitation/ Reinstatement	**10**	• Clean up and remove any spills and contaminated soil in the appropriate manner.	Johannesburg Water	During operation and maintenance activities	• EO compliance	• Inspection report. • Audit report by External Auditor.

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		• Ensure that no discarded materials are buried on site or on any other land not designated for this purpose. • Rehabilitate any disturbed areas as soon as maintenance or construction in the area is complete. • If disturbed areas are left to rehabilitate naturally, they must be frequently monitored and interventions put in place immediately should it become necessary. Special attention must be given to the potential for soil erosion and the associated environmental degradation. It is also essential to undertake alien vegetation control and management.			monitoring. • Visual inspection. • Compliance inspection against rehabilitation plan. • JW EMP.	• Photos before and after.

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6.1 Method Statement

The objective is to ensure all construction activities are undertaken with the appropriate level of environmental awareness to minimise environmental risk. The environmental specifications are required to be underpinned by a series of Method statements, within which the Contractors and Service Providers are required to outline how any identified environmental risks will practically be mitigated and managed for the duration of the contract, and how specifications within this EMPr will be met. That is, the Contractor will be required to describe how specified requirements will be achieved through the submission of written Method Statements to Johannesburg Water Environmental Section and ECO.

Method Statement is defined as “a written submission by the Contractor in response to the environmental specification or a request by the Site Manager, setting out the plan, materials, labour and method the Contractor proposes using to conduct an activity, in such detail that the Site Manager and Environmental Officers are able to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications”. The Method Statement must cover applicable details with regard to:

- Construction procedures
- Materials and equipment to be used
- Getting the equipment to and from site
- How the equipment/material will be moved while on-site
- How and where material will be stored
- The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur
- Timing and location of activities
- Compliance/non-compliance with the Specifications, and
- Any other information deemed necessary by the Johannesburg Water.

The Contractor may not commence the activity covered by the Method Statement until it has been approved by the Site Manager, except in the case of emergency activities and then only with the consent of the Site Manager. Approval of the Method Statement will not absolve the Contractor from their obligations or responsibilities in terms of their contract.

Failure to submit a method statement may result in suspension of the activity concerned until such time as a method statement has been submitted and approved. The EO and ECO should monitor the

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construction activities to ensure that these are undertaken in accordance with the approved Method Statement.

6.2 Monitoring

- Regular inspections of the site by EO/SHE and Environmental Reps
- Immediate reporting of ineffective sediment control systems.
- Public complaints register must be developed and maintained on site.

6.2.1 Monitoring Program

OBJECTIVE: Monitor the performance of the control strategies employed against environmental objectives and standards

A monitoring programme must be in place not only to ensure conformance with the EMP, but also to monitor any environmental issues and impacts which have not been accounted for in the EMPr that are or could result in significant environmental impacts for which corrective action is required. The period and frequency of monitoring will be stipulated by the environmental authorisation (once issued). Where this is not clearly dictated, Johannesburg Water will determine and stipulate the frequency of monitoring required in consultation with the relevant authority. The contractor project manager will work with the site manager of the contractor to ensure that monitoring is conducted and reported.

The aim of the monitoring and auditing process would be to routinely monitor the implementation of the specified environmental specifications, in order to:

- Monitor and audit compliance with the prescriptive and procedural terms of the environmental specifications.
- Ensure adequate and appropriate interventions to address non-compliance.
- Ensure adequate and appropriate interventions to address environmental degradation.
- Provide a mechanism for the lodging and resolution of public complaints.
- Ensure appropriate and adequate record keeping related to environmental compliance.
- Determine the effectiveness of the environmental specifications and recommend the requisite changes and updates based on audit outcomes, to enhance the efficacy of environmental management on site.
- Aid communication and feedback to authorities and stakeholders.

6.2.2 Method of Monitoring

The Environmental Officer will ensure compliance with the EMP and will conduct monitoring activities. The EO will undertake site inspections monthly or as specified in the environmental authorisation once issued.

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6.2.3 Monitoring Reports

Environmental Monthly reports will be compiled by the EO monthly and must be submitted to Environmental Specialist. The report should include details of the activities undertaken in the reporting period, any non-conformances or incidences recorded, corrective action required and details of these non-conformances or incidents which have been closed out.

A document handling system must be established to ensure accurate updating of EMP documents, and availability of all documents required for the effective functioning of the EMP. The complied environmental file must be ISO14001:2015 conformant as per JW environmental file specification (Annexure B). Supplementary EMP documentation could include:

- Method Statements.
- Environmental Action Plan
- Environmental File Site instructions.
- Emergency preparedness and response procedures.
- Record of environmental incidents.
- Non-conformance register
- Training records.
- Site inspection reports.
- Waste Register
- Water Usage Register
- Fauna and Flora Register
- Hazardous chemical Inventory list
- Monitoring reports.
- Auditing reports; and
- Public complaints register (single register for maintained for overall site).

Table 4: Monitoring Programme

ISSUE	FREQUENCIES OF MONITORING	RESPONSIBLE PERSON
WATER		
Prevention of water pollution Prevention of stagnant water on site. Proper functioning of sanitation facilities	Weekly in rainy season Weekly in rainy season Weekly	Contractor's Representative (CR)/ Johannesburg Water

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ISSUE	FREQUENCIES OF MONITORING	RESPONSIBLE PERSON
SOIL		
Surface or gully erosion on site Soil contamination with oils If small, clean up. If large, appoint a suitable contractor for clean-up.	Weekly in rainy season Monthly Immediately	CR/JW CR/JW CR/JW
Air		
Control domestic fires. Heavy vehicle emission control. Dust control of access roads. Wetting when required.	Weekly Monthly Weekly inspection	CR/ JW CR/JW CR
WASTE		
Efficiency of domestic waste collection. Prevention of burning of solid/liquid wastes on site. Proper collection and containment of liquid wastes (petroleum, oils, paints, resins & cooking oils) The recycling and/or disposal thereof. The collection and disposal of construction waste (concrete, wood, steel) Collection of hazardous waste.	Weekly Weekly Monthly Biweekly Monthly Biweekly	CR/JW CR/JW CR/JW CR CR/JW CR/JW
WILDLIFE		
Weed Control Control of illegal hunting or snaring of game, birds, or other wild animals.	On-going On-going	CR/JW CR/JW
SOCIAL		
Inspect overall appearance of site.	Weekly	CR

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ISSUE	FREQUENCIES OF MONITORING	RESPONSIBLE PERSON
(Paint work, cleanliness & housekeeping)		
Resolve complaints	Daily	CR/JW
Monitor behaviour of labourers	Daily	CR/JW
SAFETY		
Inspect road signs, pedestrian, and vehicle behaviour	At least once a week	CR/JW

6.3 Internal Audits and Reporting

Typically, an audit analyses the results obtained from monitoring, assesses whether objectives and targets have been met and whether there are variances from the stipulated EMP and legal requirements. In addition, the audit assesses whether EMP implementation has been undertaken according to planned arrangements and that the EMP itself is being appropriately updated. The audit should confirm that identified corrective actions have been undertaken and then assess the effectiveness of such actions. The timing of audits should be included in the implementation schedule in the EMP.

The key steps in a successful audit are:

- Establish audit procedures.
- Determine the frequency of audits.
- Ensure that the auditors are competent, in that they must be able to undertake the audit objectively and competently. Audits may be undertaken by internal or external parties, although certain I&AP requirements may define a need for external auditors.
- Maintain records of audits.

A procedure is to be developed by the project management team for conducting EMP audits, and should incorporate processes for scheduling and reporting, as well as the timing and frequency of the audits. This procedure should also address responsibilities and required resources. The EO is usually responsible for the maintenance of the environmental audit information that is required prior, during and

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after an audit. Internal audits must be undertaken by Johannesburg Water Environmental Section on monthly basis.

6.3.1 Monthly compliance rating

A monthly compliance rating will be calculated for each Principal Contractor as per a formula determined by Johannesburg Water SOC Ltd focussing on or incorporating outcomes of assurance (e.g., monthly audit), operational assessments and other requirements, as necessary. Johannesburg Water SOC Ltd reserves the right to adjust the monthly compliance calculation formula as and when required – each revision of the monthly compliance calculation formula will be communicated to the Principal Contractor before implementation (**Each Principal Contractor is required to maintain a minimum compliance rating of 93% (Ninety-Three Percent).**

Table 5: Compliance Rating Protocol

Classification	Scoring	Classification description
Good	**93 – 100%**	Substantial compliance
Average	**80-92%**	Compliance status needs to be improved
Poor	**61-79%**	Methods to ensure compliance require substantial improvement
Very poor	<60%	Methods to ensure compliance failed completely - no system in place

6.3.2 Work Stoppage

Work stoppages will be identified for 2 (two) types of work stoppages to be implemented:

- Overall work stoppage – the Principal Contractor and its Contractors are not allowed to continue with any type of construction / site work up until the work stoppage has been closed-out.
- Activity work stoppage – The Principal Contractor and its Contractors are not allowed to continue with the specific activity / task / job up until the work stoppage has been closed-out (**Overall work stoppages will be issued where non-conformances are identified against the criteria in Annexure C).**

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6.4 Environmental Awareness Plan

OBJECTIVE: Ensure all operation personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm (Environmental Awareness Plan).

To achieve effective environmental management, it is important that Contractors and site employees are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMP. Johannesburg Water is responsible for informing its employees and contractors (transportation contractor) of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. Johannesburg Water's obligations in this regard include the following:

- Employees must have a basic understanding of the key environmental features of the depot and its surrounding environment.
- Ensuring that a copy of the EMP is readily available on-site and that all site staff is aware of the location and has access to the document.
- Employees must be familiar with the requirements of the EMP and the environmental specifications as they apply to the operation of the facility.
- Ensuring that, prior to commencing any new site works, all employees have attended an Environmental Awareness Training course. The course must provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
- Awareness of any other environmental matters, which are deemed to be necessary by the depot manager.
- Ensure that construction workers have received basic training in environmental management, including the storage and handling of hazardous substances, minimise of disturbance to sensitive areas (wetland), management of waste and prevention of water pollution
- Records must be kept of those that have completed the relevant training.
- Training should be done either in a written or verbal format but must be in an appropriate format

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and language for the receiving audience

- Refresher sessions must be held to ensure the operating staffs are aware of their environmental obligations.

Therefore, prior to the commencement of construction activities on site and before any person commences with work on site thereafter, adequate environmental awareness and responsibility are to be appropriately presented to all staff present onsite, clearly describing their obligations towards environmental controls and methodologies in terms of this EMPr. This training and awareness will be achieved in the following ways:

6.4.1 Environmental Awareness and Training

Environmental Awareness and Training must be undertaken by the Environmental Officer or SHE/ELO and must take the form of an on-site talk and demonstration by the Environmental Officer before the commencement of construction activities on site. A record of attendance of this training must be maintained by the Environmental Liaison Officer/SHE Officer on site.

6.4.2 Formal Environmental Training

NB: JW must ensure that there is a budget allocated for environmental formal training in CAPEX projects for the skills development of contractor staff, development of community where project is being undertaken. The principal Contractor shall identify short courses and include them on the training matrix that can be done on site during project duration. The following are some of the trainings that can be done on site:

- ISO14001:2015 Environmental Management System Awareness
- Handling of beehives
- Snake awareness and handling
- Environmental legal Liability.
- Waste Management
- Environmental Site Representative
- Recycling
- Grass cutting training

DISCLAIMER
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The principal Contractor must ensure that they are appointing a registered company that meet all the requirements and before appointment of service provider, the files shall be submitted to Environmental Section for evaluation.

6.4.3 Induction Training

Environmental induction training must be presented to all persons who are to work on the site, be it for short or long durations. Contractors or Engineers staff, site staff, sub-contractors, or visitors to site. This induction training should include discussing Johannesburg Water's environmental policy and values, the function of the EMP and the importance and reasons for compliance to these. The induction training must highlight overall dos and don'ts on site and clarify the repercussions of not complying with these. The reporting procedure must be explained during the induction as well. Opportunity for questions and clarifications must form part of this training. A record of attendance of this training must be maintained by the SHE officer on site.

6.4.4 Toolbox Talks

Toolbox talks should be held on a scheduled and regular basis (at least once a month) where the foreman/site supervision manager, environmental and safety representative and all employees on site hold talks relating to environmental practices and safety awareness on site. These talks should also include discussions on possible common incidents occurring on site and the prevention of reoccurrence thereof. Records of attendance and the awareness talk subject must be kept on file.

6.5 Erosion Management Plan

The objective to control soil erosion from an ecological perspective is:

- To reduce the effects of raindrop splash erosion on exposed soil surfaces.
- To keep rainwater on the soil surface for as long as possible to increase the infiltration rate and reduce surface runoff.
- To reduce the speed of surface runoff to reduce the erosion effect of the soil surface.
- To provide methods to retain soil, debris, seed banks and organic matter being carried away by runoff.
- To improve water retention of the area (Coetzee, 2005).

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a) Areas with a high soil erosion potential on the site

Areas identified as being of high soil erosion potential on the site include:

- Any areas without vegetation cover
- Excavated areas
- Steep areas
- Areas which undergo overland flow of water.
- Areas close to water
- Irrigated areas
- Compacted areas
- Rivers
- Drainage lines
- Any areas where developments cause water flow to accelerate on a soil surface.

If any erosion features are present as a result of the activities mentioned above the ELO must:

Assess the situation.

- Take photographs of the soil degradation.
- Determine the cause of the soil erosion.
- Inform and show the relevant contractors the soil degradation.
- Inform the contractor that rehabilitation must take place and that the contractor is to implement a rehabilitation method statement and management plan.
- Monitor that the contractor is taking action to stop the erosion and assist them where needed.
- The progress of the rehabilitation must be monitored weekly and recorded in the site diary.
- All actions with regards to the incidents must be reported on in the monthly Audit report.
- If the erosion incident has not been addressed by the contractor within 14 days of you reporting it, the Johannesburg Water ‘s Environmental Section must be informed.

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The contractor/ developer (with the EO's consultation) must:

- Select a system to treat the erosion
- Design the treatment system
- Implement the system
- Monitor the area to see if the system functions like it should, if it the system fails adapt or adjust the system to ensure erosion is controlled.
- Monitoring must continue until the area has been stabilized

b) General Erosion

The civil works contractor may use the following instruments to combat erosion when necessary:

- Reno matrices
- Slope attenuation
- Shade catches nets
- Mulching
- Hydro-seeding or transplanting
- Re-vegetating
- Tilling (roughing the surface)

c) Erosion Management control measures

- Areas susceptible to erosion must be protected by appropriate measures and repair of any damage caused by erosion due to construction activities must be undertaken as soon as possible.
- Minimise erosion and sedimentation into water courses through effective stabilisation (gabions and reno-mattresses) and re-vegetation of disturbed riverbanks (Refer to rehabilitation specifications and erosion control measures below).
- Stabilisation of sandy, dispersive slopes or slopes steeper than 1:3 will be required. Ensure that bare soil is covered, and hydro seeded to reduce topsoil loss.

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- Ensure that all soil surfaces are protected by vegetation or a covering to avoid the surface being eroded by wind or water.
- Ensure that heavy machinery don't compact areas that are not meant to be compacted as this will result in compacted hydrophobic, water repellent soils which increase the erosion potential of the area.

d) Surface water control measures

- Prevent the concentration or flow of surface water or storm water down cut or fill slopes or along pipeline routes or roads and ensure measures to prevent erosion are in place prior to construction.
- Storm water and any runoff generated by hard surfaces should be discharged into retention swales or areas with rock riprap.
- These areas should be grassed with indigenous vegetation.
- These energy dissipation structures should be placed in a manner that flows are managed prior to being discharged back into the natural water courses, thus not only preventing erosion, but also supporting the maintenance of natural base flows within these systems, i.e., hydrological regime (water quantity and quality) is maintained.
- Mitigate against siltation and sedimentation using the above-mentioned structures and ensure that all structures do not cause erosion.
- Ensure that all storm water control features have soft engineered areas that attenuate flows, allowing for water to percolate into the local aquifers.
- Minimise and restrict site clearing to areas required for construction purposes only and restrict disturbance to adjacent undisturbed natural vegetation.
- Vegetation clearing should occur in parallel with the construction progress to minimize erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment.
- Minimise the diversion of flows into different catchments.

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- If implementing dust control measures, prevent over-wetting, saturation and run-off that may cause erosion and sedimentation.
- Water course (stream) crossings should not trap any run-off, thereby creating inundated areas, but allow for free-flowing water courses.

e) Environmental Incident/Accident

All environmental related incidents should be reported to environmental section. The ELO should compile and keep an Incidents and Accidents Register on the file/book in which all environmental related incidents and accidents are recorded, e.g., chemical spills, fires, accidents involving workers and vehicles, etc.

The following information must be recorded in the Incidents Register:

- The name and contact details of the persons involved
- The person recording the incident
- The date and time of incident
- The nature, extent, and cause of the accident
- The name and contact details of any persons notified of the incident
- The actions taken to deal with the incident and whether the accident has been sufficiently
- Dealt with additional steps required to prevent recurrence of the incident.

7. RECORD KEEPING, COMPLIANCE AND PENALTIES

Various records will be kept on site for monitoring purposes these include but not limited to:

- Copy of Environmental Management Plan
- Approved Environmental Method Statements
- Environmental Authorisation
- Environmental induction attendance register
- Hazardous chemicals register
- Waste disposals register and disposal certificates

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- Oil/fuel spill register

Records of non-compliance shall also be kept on record and will include the nature and magnitude of the non-compliance in a register, the action taken to discontinue the non-compliance, the action taken to mitigate its effects and the results of the actions. External complaints received regarding activities on the construction site pertaining to the environment shall be recorded in public complaints register and the response noted with the date and action taken. This record shall be submitted with the monthly reports and a verbal report given at the monthly site meetings. A score of 90% is required for the Monthly Audit undertaken by the Johannesburg Water 's Environmental Officers.

8. DECOMMISSIONING

Objective

- To avoid and or minimise the potential environmental and social impacts associated with the decommissioning phase

Mitigation Measures

Mitigation measures as detailed in the construction phase on the EMP regarding impacts on flora, fauna, habitats, and wetlands would be applicable to this phase.

- Rehabilitation to be undertaken in terms of specifications outlined in the Rehabilitation section of this EMP as well as in terms of any specific requirements applicable at the time.
- Johannesburg Water EO will need to supervise and monitor all decommissioning activities as per the snag list.
- All disturbed areas should be rehabilitated closer to its original state and more.

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Retainable Annexure A (Ref: Annexure 5 of JW 6.4): Acknowledgement of EMP specification by the Contractor.

Environmental Requirement for Contractors and Suppliers working for Johannesburg Capital Expenditure (CAPEX) projects	**Unique no**	**JWEMP:122017**
	Revision no	**00**

I, the undersigned, hereby acknowledge that I have obtained copies of the following listed documentation and confirm that I fully understand the contents thereof and the consequences of non-compliance. The Contractor furthermore reiterates its commitment to compliance of the requirements contained within the following provided documentation:

Name of the Contractor	
Vendor Number	
Project Number	
Scope of Work	
Declaration by Capital Expenditure Projects Contractor	
• I undertake to adhere to the requirements as set out in: - Johannesburg Water Environmental Management Plan and Waste Management Plan - Environmental requirements for Contractors working on Capital Expenditure Projects • I undertake to comply with all applicable environmental legal and other requirements. • Undertake to comply with Johannesburg Water 's environmental standards, policies, and procedures where applicable. • I pledge to inform all staff of their role in managing environmental impacts on site. • I am fully aware that incidents must be reported within 24 hours of occurrence. • I pledge to always implement environmental best practice on site during the contract. • I pledge that all non-conformances issued to us will be addressed promptly.	

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3.This EMP does not exempt the Contractor from complying with other relevant legislations related to the construction activities.

I …… hereby acknowledge that I have obtained copies of Johannesburg Water Environmental Management Plan and Waste Management Plan and confirm that I fully understand the contents thereof and the consequences of non-compliance. The Contractor furthermore reiterates their commitments to compliance of the requirements contained within the following provided documentations and conform to all above mentioned requirements.

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

Contractor Reperesentative Name:	Signature:	Date:
Designation:		
JW Project Engineer/Manger (Witness) Name:	Signature:	Date:

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Annexure B: Contractors Environmental File Evaluation Form

	CONTRACTORS ENVIRONMENTAL FILE EVALUATION FORM		
	A minimum score of 80% is required on all sections for the approval of the submitted Environmental file System. Failure to achieve the required score will result in non-approval of the Environmental file, and the project will not commence prior file approval.		
ENVIRONMENTAL SYSTEM EVALUATION OUTCOME			
AVERAGE SCORE OBTAINED			**0.00%**
		APPROVED/REJECTED	
EVALUATED BY:	**REVIEWED BY:**	**APPROVED/REJECTED BY:**	**ACKNOWLEDGED BY:**
DESIGNATION:	**DESIGNATION:**	**DESIGNATION:**	**DESIGNATION:**
SIGNATURE:	**SIGNATURE:**	**SIGNATURE:**	**SIGNATURE:**
DATE:	**DATE:**	**DATE:**	**DATE:**

PROJECT DETAILS			
Contract Number			
Project Title			
Name of Contractor			
Is the project screened?	YES/NO	IF NO	Construction activities/work (including site establishment) should ONLY commence when after the project is Screened

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Specialist Studies/Report				
Environmental Authorisation (If applicable)				
Water Use Licence /General Authorisation (If applicable)				

SCORE ANALYSIS		
	Satisfactory (Approved)	Requirements have been met
0.00%	Unsatisfactory (Not Approved)	Requires substantial improvement / partially achieved

ENVIRONMENTAL REQUIRED DOCUMENTS		
1	Copy EMP and signed acknowledgement letter for JW EMP	0
2	SHE/ELO appointment letter	0
3	Contractor Environmental Induction presentation	0
3	Environmental Toolbox talk and copy of attendance register template	0
5	Environmental Objective (Site specific)	0
6	Environmental Policy Statement	0
7	**Registers**	0
3	Legal Register (Site specific)	0
9	Environmental Aspect and Impact register (site specific)	0
10	Permit register	0
11	Non-Conformance Register	0
12	Waste register template	0
13	Complaint register	0
14	Incident register	0

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15	Method statement register	0
16	Hazardous substances register	0
17	Daily Environmental checklist/ weekly checklist and spill kit checklist	0
18	Spill kit checklist	0
19	**Method statements or procedures**	0
20	Document control procedure	0
21	Storm water management plan/ Erosion control	0
22	Alien invasive and weeds control plan	0
23	Hazardous Management Plan/ Procedure (i.e., handling of hazardous substances)	0
24	Method statement for the activities to be undertake/ (include environmental aspects on the technical MS)	0
25	Waste management plan/ Method statement for waste management	0
26	Incident report template (Flash report/Investigation report)	0
3	Emergency Response Plan	0
28	Training Matrix	0
29	Dust Management Plan or Method Statement for dust suppression	0
30	Contractor Audit procedure/template	0
31	Rehabilitation Plan or Method Statement for Rehabilitation/Reinstatement	0
TOTAL		**0**

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Annexure C: Environmental Work instruction

ENVIRONMENTAL MANAGEMENT (EM) SITE INSTRUCTION Document No: JW- EMS-HO—R014	

1. All JW rules and regulation including JW Environmental Management Plan and other applicable legislation, standard and by-laws must be adhered to at all times.
2. Copies of Environmental Authorisation, Water Use License/General Authorization, Rehabilitation plan, EMP shall be kept on site **(where applicable).**
3. All JW sites must have waste bins, drip trays, spill kit and designated hazardous storage **(where applicable).**
4. Only registered Waste Service providers who comply with National Environmental Management Waste Act and Municipal By-laws shall be appointed.
5. No burning or burying of waste is allowed on site.
6. The conservation of water and the use of energy efficiently shall be implemented in all JW sites.
7. The letter from City Parks for occupying the open space shall be received and kept in the file and if the land belongs to the private owner, the copy of an agreement letter shall be kept in the file **(where applicable).**
8. The photos are taken before and during and after the project **(where applicable).**
9. The Environmental file must be approved before the commencement of works on site **(where applicable).**
10. The Environmental file will be kept on site all the times and shall be made available to competent authority and JW environmental representative **(where applicable).**
11. Rehabilitation/ reinstatement of the site must be done as per the JW EMP, rehabilitation method statement.
12. The hazardous waste must only be stored not more than 90 days on site as per the legislation.
13. Only asbestos registered service providers shall be appointed to handle and dispose asbestos to registered landfill site.
14. No mixing of general and hazardous waste will be allowed.
15. No cutting of trees is allowed on site without permit.
16. If archaeological artefacts or anything of heritage importance are found at JW sites/ servitude Environmental Section must be informed.
17. Everyone working within JW sites shall familiarize with the EMP requirements and other applicable JW environmental procedures.

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18. All the environmental incidents shall be reported within 24 hours to JW environmental Section.
19. Ensure that all JW employees and its service providers or suppliers receive environmental induction.
20. All work must be carried out under close supervision by the competent persons.
21. Repetitive findings or non-compliances shall be avoided.
22. Topsoil stockpile shall be protected by erosions control berms if it is exposed to a period of 14 days during wet season (where applicable).
23. Only 150mm of topsoil shall be removed and stockpile at a height of not more than 1m.
24. All hazardous material must be stored on a bunded and ventilated storage, and MSDS must be available for all of them.
25. No painting or marking of natural features is allowed on site.
26. Pollution of the environment shall be prevented all the times.
27. No leaking mobile plant is allowed on site.
28. Dust control measures shall be implemented on site (where applicable).
29. No sewer spillage shall spill into the storm water or the watercourse.
30. All environmental related incidents and/or emergencies shall be investigated within 48 hours from the date of notice.
31. Killing of fauna and/or Avifauna is prohibited.
32. Alien invasive and weeds must be eradicated.
33. Fumigation shall be done by trained personnel that is registered with DAFF.
34. No smoking is allowed in restricted areas. All such areas are posted appropriately.
35. Personal protective equipment is required to be worn at all times in production areas.
36. Maintain good housekeeping in your work area.
37. Keep fire lanes, roadways, walkways, and aisles free and clear of material.
38. The use of unsafe or defective equipment or tools is not permitted.
39. A contractor or subcontractor shall leave no unused materials on site. At the completion of a project the contractor shall remove all unused material and all waste shall be properly disposed of at a registered landfill site.
40. Any contractor or subcontractor found to be in violation of any EH&S rules can be ejected or escorted off premises if deemed necessary.
41. This file shall be kept on site and will be available at all times to the JW Reps and authorities (upon request).

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ENVIRONMENTAL MANAGEMENT PLAN

ACKNOWLEDGEMENT BY MANAGER/CONTRACTOR
I, _____ the Manager/Contractor, do hereby declare that my site/company _____ _____acknowledges having read and understood the conditions contained in this document and furthermore, the employees agree to abide by these conditions.

CONTRACTORS/FACILITY REP.	SIGNATURE	DATE

ENVIRONMENTAL SITE INSTRUCTION		Document No: **JW- EMS-HO—R014**	
Name of Contractor/Facility			
Responsible Manager/ Engineer			
Project No. ***(where applicable):***	Date Issued:	Date of Inspection:	
Environmental Representative:		Designation:	

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Should the responsible persons fail to comply with any term of this instruction, JW may demand compliance in writing from the defaulting party. Should the defaulting party fail to comply within the stipulated time frames, JW shall take the necessary steps to remedy the situation.	**PROJECT DESCRIPTION**
Reference No. of Non-Conformances	**Action Required**
EM-1.	
EM-2.	
EM-3.	
EM-4.	
EM-5.	
EM-6.	
EM-7.	
EM-8.	
EM-9.	
EM-10.	

Received & Acknowledged by	**Signature**	**Date**
Responsible Manager/Contractor		
Responsible Consultant ***(where applicable)***		

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JW Environmental Representative			
JW Project Inspector / Engineer ***(where applicable)***			
Contractor SHE/EL Officer ***(where applicable)***			
COMMENTS BY RESPONSIBLE MANAGER/ENGINEER:		**Target date for corrections**	
		Accepted/Acknowledged by Manager/Contractor	
COMMENTS BY CONTRACTOR *(WHERE APPLICABLE)*:		**Follow up comments by JW Environmental Representative**	

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Annexure D: Johannesburg Water General Surface Rehabilitation Specification

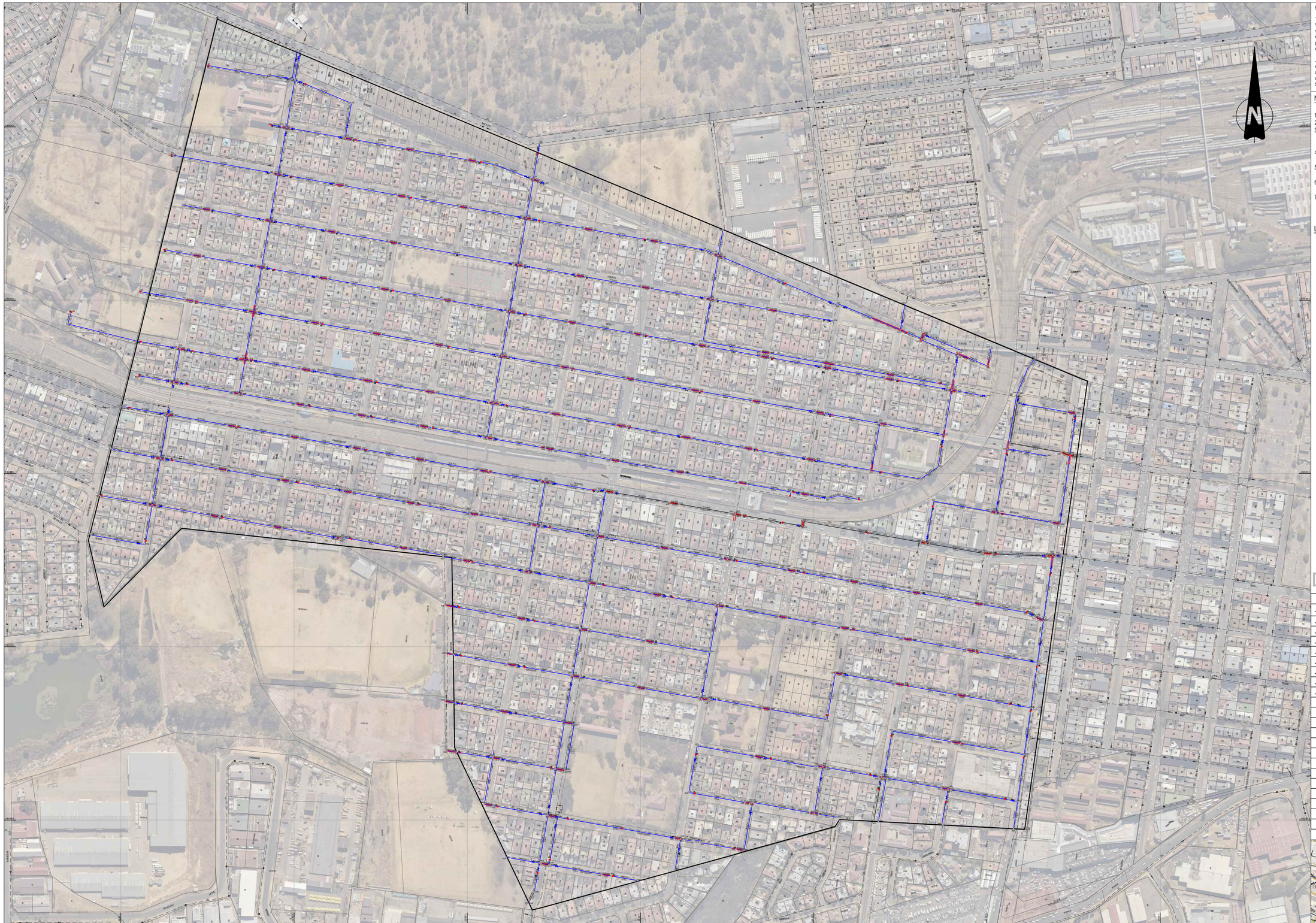
Johannesburg Water General Surface Rehabilitation Specification

Doc No: JW-EMS-CAPEX-T040
Effective Date:14/9/2021

No.	Description	Unit	A Quantity	B Master Rate	C Multiplication factor	D Weighting factor 1	E=A*B*C*D Amount (Rands)
1	Rehabilitation Plan	m2	0	10.05	1	1	0
2	Rehabilitation of disturbed area/s including roads (prepare the ground/level profiling, soil surfaces including	m2	0	22.05	1	1	0
2	Replacement/import of topsoil (if required)	m2	0	22.05	1	1	0
3	Planting of grass/hydroseeding (Including hydro seeding seed mix ratio).	m2	0	22.05	1	1	0
4	Maintenance for 3 months (weed removal, replanting, soil conditioner, erosion repairs etc.)	m2	0	17.4	1	1	0
5	Rehabilitation close-out report	m2	0	10.05	1	1	0
6	Bioremediation (ONLY if applicable for contaminated areas/land) Process to be determined if required.	m2	0	22.05	1	1	0
					Sub Total 1		0

7	Preliminary and General	0	weighting factor 2 1	0
8	Contingencies		0	0
			Subtotal 2	0.00
			VAT (15%)	0.00
			Grand Total	0

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N
BARTLETT
QUEENS
PARKROOF
CENTRAL
HOSPITAL
HOSPITAL HILL
CHROMIUM
RIVERSIDE
RIVERSIDE VIEW
RIVERSIDE VIEW EXT
TWENTY SEVEN
TWENTY SEVEN EXT
TWENTY SEVEN EXT 2
TWENTY SEVEN EXT 3
TWENTY SEVEN EXT 4
TWENTY SEVEN EXT 5
TWENTY SEVEN EXT 6
TWENTY SEVEN EXT 7
TWENTY SEVEN EXT 8
TWENTY SEVEN EXT 9
TWENTY SEVEN EXT 10
TWENTY SEVEN EXT 11
TWENTY SEVEN EXT



DETAIL 1 - FITTINGS TABLE

ITEM No.	DESCRIPTION	QUANTITY
1	DN350Ø x DN250Ø - UNEQUAL TEE - FLANGED ALL ENDS. 16 BAR WORKING PRESSURE	1
2	DN250Ø mPVC CLASS 16 DISTANCE PIPE PIECE VICTAULIC GROOVED ALL ENDS. ***note: Length of pipe to be determined on site by engineer.***	1
3	DN250Ø - VIKING JOHNSON - PIPE CONNECTION. 16 BAR WORKING PRESSURE	1

DETAIL 1A
SCALE N.T.S.

DETAIL 1B - FITTINGS TABLE

ITEM No.	DESCRIPTION	QUANTITY
1	DN110Ø - 90° BEND - ALL ENDS VICTAULIC GROOVED - CAST IRON, 16 BAR WORKING PRESSURE	1
2	DN110Ø TO DN75Ø REDUCER - ALL ENDS VICTAULIC GROOVED,16 BAR WORKING PRESSURE	1
3	DN75Ø mPVC CLASS 16 DISTANCE PIPE PIECE VICTAULIC GROOVED ALL ENDS. ***note: Length of pipe to be determined on site by engineer.***	1
4	DN75Ø - VIKING JOHNSON - PIPE CONNECTION. 16 BAR WORKING PRESSURE	1

DETAIL 1B
SCALE N.T.S.

DETAIL 2 - FITTINGS TABLE

ITEM No.	DESCRIPTION	QUANTITY
1	DN350Ø x DN100Ø - UNEQUAL TEE - FLANGED ALL ENDS. 16 BAR WORKING PRESSURE	1
2	DN110Ø mPVC CLASS 16 DISTANCE PIPE PIECE VICTAULIC GROOVED ALL ENDS. ***note: Length of pipe to be determined on site by engineer.***	1
3	DN100Ø - VIKING JOHNSON - PIPE CONNECTION. 16 BAR WORKING PRESSURE	1

DETAIL 2
SCALE N.T.S.

DETAIL 3 - FITTINGS TABLE

ITEM No.	DESCRIPTION	QUANTITY
1	DN100Ø - 45° PRESSURE BEND WITH SOCKET JOINT ONE END - PLAIN OTHER END. 16 BAR WORKING PRESSURE	2
2	DN110Ø mPVC CLASS 16 DISTANCE PIPE PIECE VICTAULIC GROOVED ALL ENDS. ***note: Length of pipe to be determined on site by engineer.***	2
3	DN100Ø IRON ADAPTOR FROM PVC - STEEL. 16 BAR WORKING PRESSURE	1

DETAIL 3
SCALE N.T.S.

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NOTES

1. ALL NEW FIRE HYDRANTS ARE ABOVE GROUND.
2. uPVC PIPE ARE CLASS 16 HIGH IMPACT PIPES.
3. ALL PIPES TO BE LAID IN ACCORDANCE WITH SANS 1200, LATEST REVISION AND THE REQUIREMENTS OF JOHANNESBURG WATER SOC LTD.
4. CONTRACTOR TO CONFIRM LEVELS OF EXISTING PIPES BEFORE COMMENCING CONSTRUCTION.
5. POSITIONS OF ALL EXISTING SERVICES ARE APPROXIMATED AND MUST BE VERIFIED ON SITE.
6. FOR ALL CONNECTIONS TO EXISTING STEEL AND AC PIPES USE COUPLING OR SIMILAR APPROVED.
7. ALL CONSTRUCTION WORK TO BE CARRIED OUT IN STRICT ACCORDANCE WITH JOHANNESBURG WATER STANDARDS

LEGEND

- : NEW HYDRANT
- : NEW HIGH IMPACT PIPE
- : NEW VALVE
- : EXISTING VALVE
- : EXISTING PIPE
- : EXISTING AIR VALVE
- : EXISTING BULK METER
- : PIPES TO BE DECOMMISSIONED
- No. : WATER NODE NUMBER
- : ROAD CROSSING (TRENCHLESS TECHNOLOGY)

ISSUED FOR TENDER

REFER TO DRAWING No:	
JW14508-MAY-WAT-LAY-000	GENERAL ARRANGEMENT LAYOUT
JW14508-MAY-WAT-LAY-001	SHEET 1 OF 7
JW14508-MAY-WAT-LAY-002	SHEET 2 OF 7
JW14508-MAY-WAT-LAY-003	SHEET 3 OF 7
JW14508-MAY-WAT-LAY-004	SHEET 4 OF 7
JW14508-MAY-WAT-LAY-005	SHEET 5 OF 7
JW14508-MAY-WAT-LAY-006	SHEET 6 OF 7
JW14508-MAY-WAT-LAY-007	SHEET 7 OF 7
JW14508-MAY-WAT-LAY-008	COORDINATE TABLE
WATER STANDARD DRAWINGS	
JW100-DET02-W01	BEDDING DETAIL
JW100-DET03-W01	TYPICAL VALVE BOX
JW100-DET04-W01	TYPICAL SCOUR VALVE
JW100-DET05-W01	TYPICAL TRUST BLOCK DETAILS
JW100-DET06-W01	FIRE HYDRANT DETAIL
JW100-DET07-W01	WATER ERF CONNECTION
JW100-DET08-W01	METERED FIRE CONNECTION
JW100-DET09-W01	ABOVE GROUND WATER METER
JW100-DET10-W01	PRV CHAMBER AND DETAILS
JW100-DET11-W01	TYPICAL BULK FLOW METER DETAIL
JW100-DET12-W01	DETAIL OF SERVICE MARKER

KEY PLAN



CONSULTING ENGINEERS
CAPEX - ENGINEERING SERVICE UNIT
TURBINE HALL - 3RD FLOOR
65 NTEMI PILISO STREET
NEWTOWN
JOHANNESBURG
2113

DESIGNED	T MOELA	DATE:	12/02/26
DRAWN	K KOLBE	DATE:	12/02/26
CHECKED	T MOELA	DATE:	12/02/26
APPROVED BY:	P MOGOLOLA	DATE:	
		ECSA REG. No.	2018300335

Johannesburg Water

JOHANNESBURG WATER SOC Ltd
TURBINE HALL
65 NTEMI PILISO STREET
NEWTOWN
JOHANNESBURG
2113
TEL: +27 (0)11 688 1400
FAX: +27(0)11 688-1528

Municipality: Joburg — a world class African city

Project description:

MAYFAIR WATER PIPE REPLECEMENT PROJECT
GENERAL LAYOUT

SCALE 1:1000

AMENDMENTS

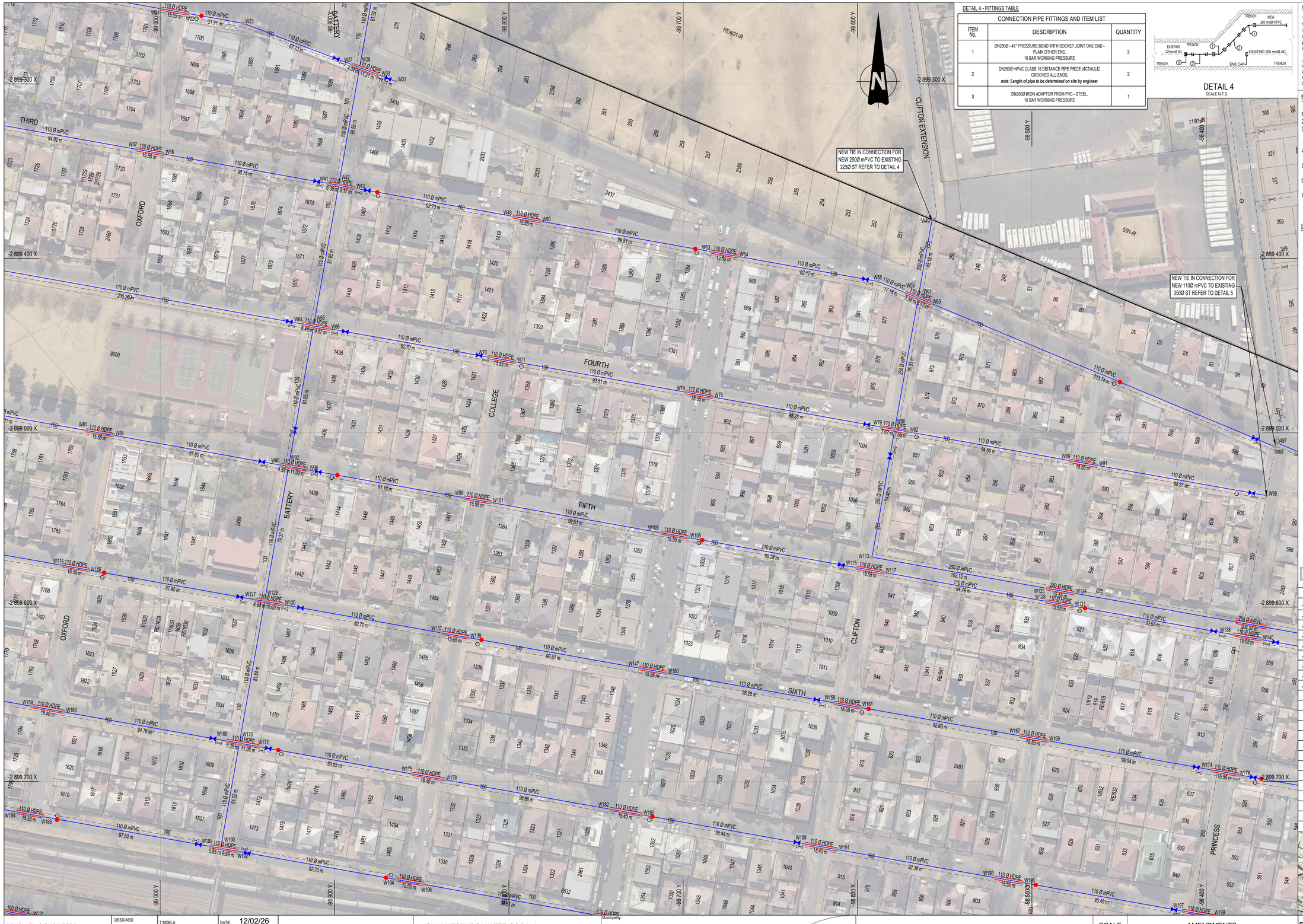
REV	DESCRIPTION	DATE	BY	APV
A	ISSUED FOR PRELIMINARY DESIGN	9/17/2024	T.M	R.N
B	ISSUED FOR DETAIL DESIGN	2025/07/16	T.M	P.M
C	ISSUED FOR TENDER REPORT	2026/02/12	T.M	P.M

DRAWING No:JW14508-MAY-WAT-LAY-001

PROJECT No.	DISCIPLINARY	REV.
UR 1300	WAT	C

ORIGINAL PAGE SIZE	SHEET	OF
A1	1	8

FILE No.



DETAIL 4 - FITTINGS TABLE

CONNECTION PIPE FITTINGS AND ITEM LIST

ITEM No.	DESCRIPTION	QUANTITY
1	DN2500 - 45° PRESSURE BEND WITH SOCKET JOINT ONE END - PLAIN OTHER END. 16 BAR WORKING PRESSURE	2
2	DN2500 mPVC CLASS 16 DISTANCE PIPE PIECE VICTAULIC GROOVED ALL ENDS. ***note: Length of pipe to be determined on site by engineer.***	2
3	DN2500 IRON ADAPTOR FROM PVC - STEEL. 16 BAR WORKING PRESSURE	1

DETAIL 4
SCALE N.T.S.

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LEGEND

- : NEW HYDRANT
- : NEW HIGH IMPACT PIPE
- : NEW VALVE
- : EXISTING VALVE
- : EXISTING PIPE
- : EXISTING AIR VALVE
- : EXISTING BULK METER
- : PIPES TO BE DECOMMISSIONED
- No. : WATER NODE NUMBER
- : ROAD CROSSING (TRENCHLESS TECHNOLOGY)

ISSUED FOR TENDER REPORT

REFER TO DRAWING No:	
JW14508-MAY-WAT-LAY-000	GENERAL ARRANGEMENT LAYOUT
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JW14508-MAY-WAT-LAY-002	SHEET 2 OF 7
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JW14508-MAY-WAT-LAY-006	SHEET 6 OF 7
JW14508-MAY-WAT-LAY-007	SHEET 7 OF 7
JW14508-MAY-WAT-LAY-008	COORDINATE TABLE
WATER STANDARD DRAWINGS	
JW100-DET02-W01	BEDDING DETAIL
JW100-DET03-W01	TYPICAL VALVE BOX
JW100-DET04-W01	TYPICAL SCOUR VALVE
JW100-DET05-W01	TYPICAL TRUST BLOCK DETAILS
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JW100-DET09-W01	ABOVE GROUND WATER METER
JW100-DET10-W01	PRV CHAMBER AND DETAILS
JW100-DET11-W01	TYPICAL BULK FLOW METER DETAIL
JW100-DET12-W01	DETAIL OF SERVICE MARKER

KEY PLAN



CONSULTING ENGINEERS
CAPEX - ENGINEERING SERVICE UNIT
TURBINE HALL - 3RD FLOOR
65 NTEMI PILISO STREET
NEWTOWN
JOHANNESBURG
2113

DESIGNED	T MOELA	SIGNATURE:	DATE: 12/02/26
DRAWN	K KOLBERG	SIGNATURE:	DATE: 12/02/26
CHECKED	T MOELA	SIGNATURE:	DATE: 12/02/26
APPROVED BY:	P MOGOLOLA	SIGNATURE:	DATE: 2018300335 ECSA REG. No:

Johannesburg Water

JOHANNESBURG WATER SOC Ltd
TURBINE HALL
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NEWTOWN
JOHANNESBURG
2113
TEL: +27 (0)11 688 1400
FAX: +27(0)11 688-1528

Municipality:

Joburg
a world class African city

Project description:

MAYFAIR WATER PIPE REPLECEMENT PROJECT
GENERAL LAYOUT

SCALE 1:1000

AMENDMENTS

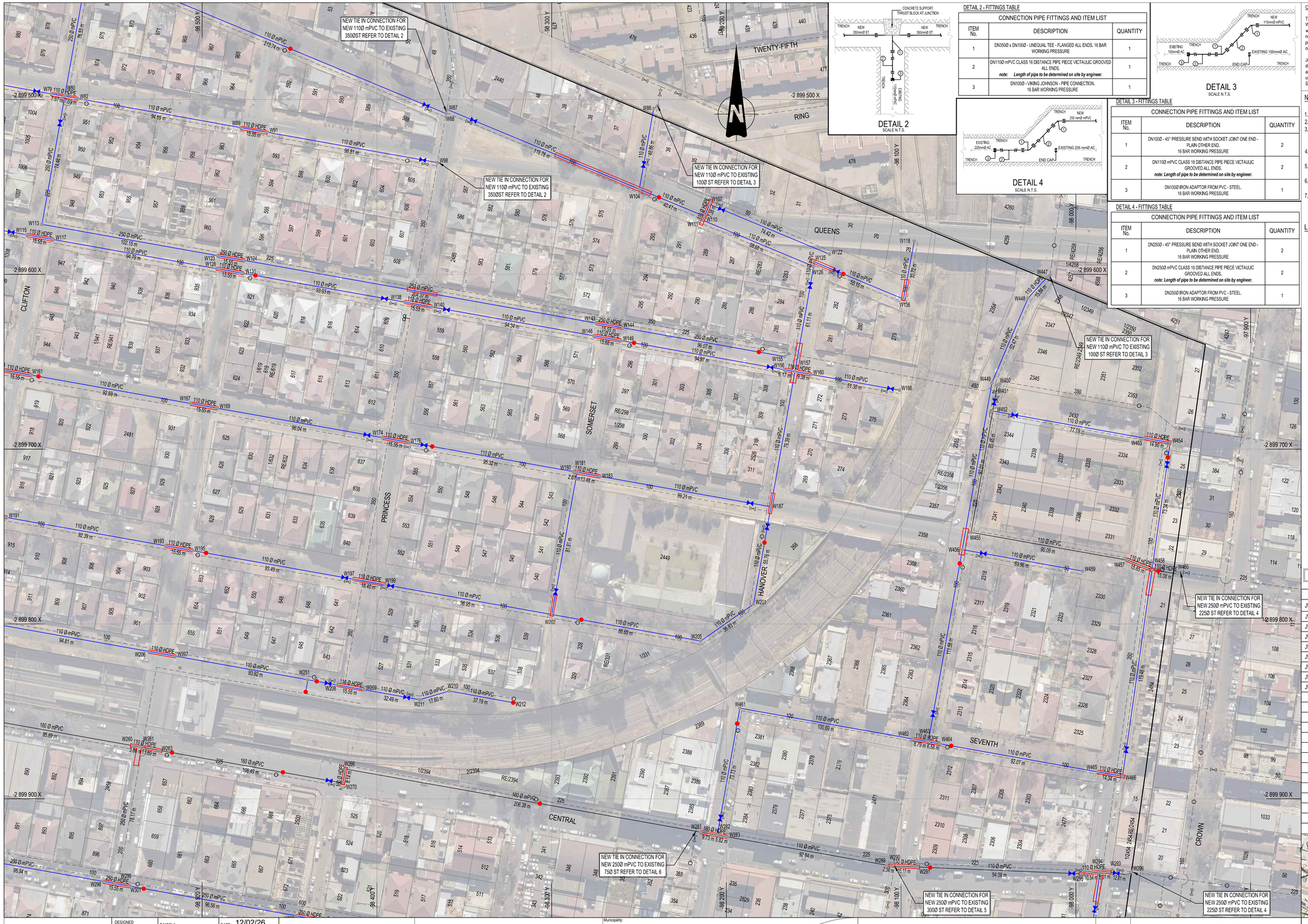
REV	DESCRIPTION	DATE	BY	APV
A	ISSUED FOR PRELIMINARY DESIGN	9/17/2024	T.M	R.N
B	ISSUED FOR DETAIL DESIGN	2025/07/16	T.M	P.M
C	ISSUED FOR TENDER REPORT	2026/02/12	T.M	P.M

DRAWING No:JW14508-MAY-WAT-LAY-002

UR 1300	WAT	C
PROJECT No.	DISCIPLINARY	REV.

A1 (ORIGINAL PAGE SIZE) SHEET 2 OF 8

FILE No.



DETAIL 2 - FITTINGS TABLE

CONNECTION PIPE FITTINGS AND ITEM LIST		
ITEM No.	DESCRIPTION	QUANTITY
1	DN350Ø x DN100Ø - UNEQUAL TEE - FLANGED ALL ENDS. 16 BAR WORKING PRESSURE	1
2	DN110Ø mPVC CLASS 16 DISTANCE PIPE PIECE VICTAULIC GROOVED ALL ENDS. ***note: Length of pipe to be determined on site by engineer.***	1
3	DN100Ø - VIKING JOHNSON - PIPE CONNECTION. 16 BAR WORKING PRESSURE	1

DETAIL 3 - FITTINGS TABLE

CONNECTION PIPE FITTINGS AND ITEM LIST		
ITEM No.	DESCRIPTION	QUANTITY
1	DN100Ø - 45° PRESSURE BEND WITH SOCKET JOINT ONE END - PLAIN OTHER END. 16 BAR WORKING PRESSURE	2
2	DN110Ø mPVC CLASS 16 DISTANCE PIPE PIECE VICTAULIC GROOVED ALL ENDS. ***note: Length of pipe to be determined on site by engineer.***	2
3	DN100Ø IRON ADAPTOR FROM PVC - STEEL. 16 BAR WORKING PRESSURE	1

DETAIL 4 - FITTINGS TABLE

CONNECTION PIPE FITTINGS AND ITEM LIST		
ITEM No.	DESCRIPTION	QUANTITY
1	DN250Ø - 45° PRESSURE BEND WITH SOCKET JOINT ONE END - PLAIN OTHER END. 16 BAR WORKING PRESSURE	2
2	DN250Ø mPVC CLASS 16 DISTANCE PIPE PIECE VICTAULIC GROOVED ALL ENDS. ***note: Length of pipe to be determined on site by engineer.***	2
3	DN250Ø IRON ADAPTOR FROM PVC - STEEL. 16 BAR WORKING PRESSURE	1

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- : NEW HYDRANT
- : NEW HIGH IMPACT PIPE
- : NEW VALVE
- : EXISTING VALVE
- : EXISTING PIPE
- : EXISTING AIR VALVE
- : EXISTING BULK METER
- : PIPES TO BE DECOMMISSIONED
- No. : WATER NODE NUMBER
- : ROAD CROSSING (TRENCHLESS TECHNOLOGY)

ISSUED FOR DETAIL DESIGN REPORT

REFER TO DRAWING No:	
JW14508-MAY-WAT-LAY-000	GENERAL ARRANGEMENT LAYOUT
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JW14508-MAY-WAT-LAY-006	SHEET 6 OF 7
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JW14508-MAY-WAT-LAY-008	COORDINATE TABLE
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JW100-DET11-W01	TYPICAL BULK FLOW METER DETAIL
JW100-DET12-W01	DETAIL OF SERVICE MARKER

KEY PLAN



CONSULTING ENGINEERS
CAPEX - ENGINEERING SERVICE UNIT
TURBINE HALL - 3RD FLOOR
65 NTEMI PILISO STREET
NEWTOWN
JOHANNESBURG
2113

DESIGNED	T MOELA	DATE:	12/02/26
DRAWN	K.KOLBERG	DATE:	12/02/26
CHECKED	T MOELA	DATE:	12/02/26
APPROVED BY:	P MOGOLOLA	DATE:	
		ECSA REG. No:	2018300335

Johannesburg Water

JOHANNESBURG WATER SOC Ltd
TURBINE HALL
65 NTEMI PILISO STREET
NEWTOWN
JOHANNESBURG
2113
TEL: +27 (0)11 688 1400
FAX: +27(0)11 688-1528

Municipality: Joburg — a world class African city

Project description:

MAYFAIR WATER PIPE REPLECEMENT PROJECT
GENERAL LAYOUT

SCALE: 1:1000

AMENDMENTS

REV	DESCRIPTION	DATE	BY	APV
A	ISSUED FOR PRELIMINARY DESIGN	9/17/2024	T.M	R.N
B	ISSUED FOR DETAIL DESIGN	2025/07/16	T.M	P.M
C	ISSUED FOR TENDER REPORT	2026/02/12	T.M	P.M

DRAWING No:JW14508-MAY-WAT-LAY-003

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PROJECT No.	DISCIPLINARY		REV.
A1	SHEET 3	OF	8
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LEGEND

- : NEW HYDRANT
- : NEW HIGH IMPACT PIPE
- : NEW VALVE
- : EXISTING VALVE
- : EXISTING PIPE
- : EXISTING AIR VALVE
- : EXISTING BULK METER
- : PIPES TO BE DECOMMISSIONED
- No. : WATER NODE NUMBER
- : ROAD CROSSING (TRENCHLESS TECHNOLOGY)

NEW TIE IN CONNECTION FOR NEW 160Ø mPVC TO EXISTING 150Ø ST REFER TO DETAIL 7

NEW TIE IN CONNECTION FOR NEW 160Ø mPVC TO EXISTING 150Ø ST REFER TO DETAIL 7

NEW TIE IN CONNECTION FOR NEW 110Ø mPVC TO EXISTING 100Ø ST REFER TO DETAIL 3

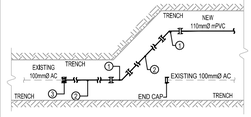
NEW TIE IN CONNECTION FOR NEW 160Ø mPVC TO EXISTING 150Ø ST REFER TO DETAIL 7

NEW TIE IN CONNECTION FOR NEW 110Ø mPVC TO EXISTING 100Ø ST REFER TO DETAIL 3

DETAIL 3 - FITTINGS TABLE

CONNECTION PIPE FITTINGS AND ITEM LIST

ITEM No.	DESCRIPTION	QUANTITY
1	DN100Ø - 45° PRESSURE BEND WITH SOCKET JOINT ONE END - PLAIN OTHER END. 16 BAR WORKING PRESSURE	2
2	DN110Ø mPVC CLASS 16 DISTANCE PIPE PIECE VICTAULIC GROOVED ALL ENDS. *note: Length of pipe to be determined on site by engineer.*	2
3	DN100Ø IRON ADAPTOR FROM PVC - STEEL. 16 BAR WORKING PRESSURE	1

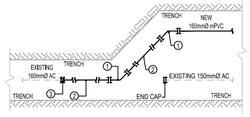


DETAIL 3
SCALE N.T.S.

DETAIL 7 - FITTINGS TABLE

CONNECTION PIPE FITTINGS AND ITEM LIST

ITEM No.	DESCRIPTION	QUANTITY
1	DN160Ø - 45° PRESSURE BEND WITH SOCKET JOINT ONE END - PLAIN OTHER END. 16 BAR WORKING PRESSURE	2
2	DN160Ø mPVC CLASS 16 DISTANCE PIPE PIECE VICTAULIC GROOVED ALL ENDS. *note: Length of pipe to be determined on site by engineer.*	2
3	DN160Ø IRON ADAPTOR FROM PVC - STEEL. 16 BAR WORKING PRESSURE	1



DETAIL 7
SCALE N.T.S.

ISSUED FOR TENDER REPORT

REFER TO DRAWING No:	
JW14508-MAY-WAT-LAY-000	GENERAL ARRANGEMENT LAYOUT
JW14508-MAY-WAT-LAY-001	SHEET 1 OF 7
JW14508-MAY-WAT-LAY-002	SHEET 2 OF 7
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JW14508-MAY-WAT-LAY-008	COORDINATE TABLE
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JW100-DET11-W01	TYPICAL BULK FLOW METER DETAIL
JW100-DET12-W01	DETAIL OF SERVICE MARKER

KEY PLAN



DRAWING No:JW14508-MAY-WAT-LAY-004

CONSULTING ENGINEERS
CAPEX - ENGINEERING SERVICE UNIT
TURBINE HALL - 3RD FLOOR
65 NTEMI PILISO STREET
NEWTOWN
JOHANNESBURG
2113

DESIGNED	T MOELA	DATE:	12/02/26
DRAWN	K KOLBERG	DATE:	12/02/26
CHECKED	T MOELA	DATE:	12/02/26
APPROVED BY:	P MOGOLOLA	DATE:	
	SIGNATURE:	ECSA REG. No:	2018300335

Johannesburg Water

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65 NTEMI PILISO STREET
NEWTOWN
JOHANNESBURG
2113
TEL: +27 (0)11 688 1400
FAX: +27(0)11 688-1528

Municipality: Joburg — a world class African city

Project description:

MAYFAIR WATER PIPE REPLECEMENT PROJECT
GENERAL LAYOUT

SCALE: 1:1000

AMENDMENTS

REV	DESCRIPTION	DATE	BY	APV
A	ISSUED FOR PRELIMINARY DESIGN	9/17/2024	T.M	R.N
B	ISSUED FOR DETAIL DESIGN	2025/07/16	T.M	P.M
C	ISSUED FOR TENDER REPORT	2026/02/12	T.M	P.M

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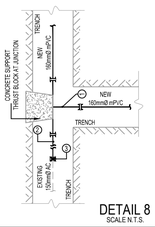
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- : NEW HIGH IMPACT PIPE
- : NEW VALVE
- : EXISTING VALVE
- : EXISTING PIPE
- : EXISTING AIR VALVE
- : EXISTING BULK METER
- : PIPES TO BE DECOMMISSIONED
- No. : WATER NODE NUMBER
- : ROAD CROSSING (TRENCHLESS TECHNOLOGY)

NEW TIE IN CONNECTION FOR NEW 110Ø mPVC TO EXISTING 100Ø ST REFER TO DETAIL 8



DETAIL 8
SCALE N.T.S.

DETAIL 8 - FITTINGS TABLE

CONNECTION PIPE FITTINGS AND ITEM LIST		
ITEM No.	DESCRIPTION	QUANTITY
1	DN160Ø x DN160Ø - EQUAL TEE - FLANGED ALL ENDS. 16 BAR WORKING PRESSURE	1
2	DN160Ø mPVC CLASS 16 DISTANCE PIPE PIECE VICTAULIC GROOVED ALL ENDS. *note: Length of pipe to be determined on site by engineer.*	1
3	DN160Ø - VIKING JOHNSON - PIPE CONNECTION. 16 BAR WORKING PRESSURE	1

ISSUED FOR DETAIL DESIGN REPORT

REFER TO DRAWING No:	
JW14508-MAY-WAT-LAY-000	GENERAL ARRANGEMENT LAYOUT
JW14508-MAY-WAT-LAY-001	SHEET 1 OF 7
JW14508-MAY-WAT-LAY-002	SHEET 2 OF 7
JW14508-MAY-WAT-LAY-003	SHEET 3 OF 7
JW14508-MAY-WAT-LAY-004	SHEET 4 OF 7
JW14508-MAY-WAT-LAY-005	SHEET 5 OF 7
JW14508-MAY-WAT-LAY-006	SHEET 6 OF 7
JW14508-MAY-WAT-LAY-007	SHEET 7 OF 7
JW14508-MAY-WAT-LAY-008	COORDINATE TABLE
WATER STANDARD DRAWINGS	
JW100-DET02-W01	BEDDING DETAIL
JW100-DET03-W01	TYPICAL VALVE BOX
JW100-DET04-W01	TYPICAL SCOUR VALVE
JW100-DET05-W01	TYPICAL TRUST BLOCK DETAILS
JW100-DET06-W01	FIRE HYDRANT DETAIL
JW100-DET07-W01	WATER ERF CONNECTION
JW100-DET08-W01	METERED FIRE CONNECTION
JW100-DET09-W01	ABOVE GROUND WATER METER
JW100-DET10-W01	PRV CHAMBER AND DETAILS
JW100-DET11-W01	TYPICAL BULK FLOW METER DETAIL
JW100-DET12-W01	DETAIL OF SERVICE MARKER

KEY PLAN



CONSULTING ENGINEERS
CAPEX - ENGINEERING SERVICE UNIT
TURBINE HALL - 3RD FLOOR
65 NTEMI PILISO STREET
NEWTOWN
JOHANNESBURG
2113

DESIGNED	T.MOELA	DATE:	12/02/26
DRAWN	K.KALBERG	DATE:	12/02/26
CHECKED	T.MOELA	DATE:	12/02/26
APPROVED BY:	P.MOGOLOLA	DATE:	
	SIGNATURE:	ECSA REG. No:	2018300335

Johannesburg Water

JOHANNESBURG WATER SOC Ltd
TURBINE HALL
65 NTEMI PILISO STREET
NEWTOWN
JOHANNESBURG
2113
TEL: +27 (0)11 688 1400
FAX: +27(0)11 688-1528

Municipality:

Joburg
a world class African city

Project description:

MAYFAIR WATER PIPE REPLECEMENT PROJECT
GENERAL LAYOUT

SCALE: 1:1000

AMENDMENTS

REV	DESCRIPTION	DATE	BY	APV
A	ISSUED FOR PRELIMINARY DESIGN	9/17/2024	T.M	R.N
B	ISSUED FOR DETAIL DESIGN	2025/07/16	T.M	P.M
C	ISSUED FOR TENDER REPORT	2026/02/12	T.M	P.M

DRAWING No: JW14508-MAY-WAT-LAY-005

PROJECT No.	DISCIPLINARY	REV.
UR 1300	WAT	C

ORIGINAL PAGE SIZE: A1 — SHEET 5 OF 8

FILE No.

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NOTES

1. ALL NEW FIRE HYDRANTS ARE ABOVE GROUND.
2. uPVC PIPE ARE CLASS 16 HIGH IMPACT PIPES.
3. ALL PIPES TO BE LAID IN ACCORDANCE WITH SANS 1200, LATEST REVISION AND THE REQUIREMENTS OF JOHANNESBURG WATER SOC LTD.
4. CONTRACTOR TO CONFIRM LEVELS OF EXISTING PIPES BEFORE COMMENCING CONSTRUCTION.
5. POSITIONS OF ALL EXISTING SERVICES ARE APPROXIMATED AND MUST BE VERIFIED ON SITE.
6. FOR ALL CONNECTIONS TO EXISTING STEEL AND AC PIPES USE COUPLING OR SIMILAR APPROVED.
7. ALL CONSTRUCTION WORK TO BE CARRIED OUT IN STRICT ACCORDANCE WITH JOHANNESBURG WATER STANDARDS

LEGEND

- : NEW HYDRANT
- : NEW HIGH IMPACT PIPE
- : NEW VALVE
- : EXISTING VALVE
- : EXISTING PIPE
- : EXISTING AIR VALVE
- : EXISTING BULK METER
- : PIPES TO BE DECOMMISSIONED
- No. : WATER NODE NUMBER
- : ROAD CROSSING (TRENCHLESS TECHNOLOGY)

NEW TIE IN CONNECTION FOR NEW 110Ø mPVC TO EXISTING 100Ø ST REFER TO DETAIL 9

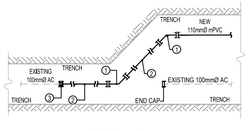
NEW TIE IN CONNECTION FOR NEW 160Ø mPVC TO EXISTING 150Ø ST REFER TO DETAIL 8

NEW TIE IN CONNECTION FOR NEW 110Ø mPVC TO EXISTING 100Ø ST REFER TO DETAIL 3

DETAIL 3 - FITTINGS TABLE

CONNECTION PIPE FITTINGS AND ITEM LIST

ITEM No.	DESCRIPTION	QUANTITY
1	DN100Ø - 45° PRESSURE BEND WITH SOCKET JOINT ONE END - PLAIN OTHER END. 16 BAR WORKING PRESSURE	2
2	DN110Ø mPVC CLASS 16 DISTANCE PIPE PIECE VICTAULIC GROOVED ALL ENDS. ***note: Length of pipe to be determined on site by engineer.***	2
3	DN100Ø IRON ADAPTOR FROM PVC - STEEL. 16 BAR WORKING PRESSURE	1

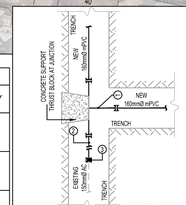


DETAIL 3
SCALE N.T.S.

DETAIL 8 - FITTINGS TABLE

CONNECTION PIPE FITTINGS AND ITEM LIST

ITEM No.	DESCRIPTION	QUANTITY
1	DN160Ø x DN160Ø - EQUAL TEE - FLANGED ALL ENDS. 16 BAR WORKING PRESSURE	1
2	DN160Ø mPVC CLASS 16 DISTANCE PIPE PIECE VICTAULIC GROOVED ALL ENDS. ***note: Length of pipe to be determined on site by engineer.***	1
3	DN160Ø - VIKING JOHNSON - PIPE CONNECTION. 16 BAR WORKING PRESSURE	1

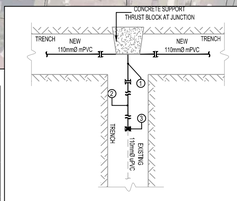


DETAIL 8
SCALE N.T.S.

DETAIL 9 - FITTINGS TABLE

CONNECTION PIPE FITTINGS AND ITEM LIST

ITEM No.	DESCRIPTION	QUANTITY
1	DN110Ø x DN110Ø - EQUAL TEE - FLANGED ALL ENDS. 16 BAR WORKING PRESSURE	1
2	DN110Ø mPVC CLASS 16 DISTANCE PIPE PIECE VICTAULIC GROOVED ALL ENDS. ***note: Length of pipe to be determined on site by engineer.***	1
3	DN110Ø - VIKING JOHNSON - PIPE CONNECTION. 16 BAR WORKING PRESSURE	1

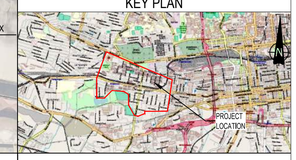


DETAIL 9
SCALE N.T.S.

ISSUED FOR TENDER REPORT

REFER TO DRAWING No:	
JW14508-MAY-WAT-LAY-000	GENERAL ARRANGEMENT LAYOUT
JW14508-MAY-WAT-LAY-001	SHEET 1 OF 7
JW14508-MAY-WAT-LAY-002	SHEET 2 OF 7
JW14508-MAY-WAT-LAY-003	SHEET 3 OF 7
JW14508-MAY-WAT-LAY-004	SHEET 4 OF 7
JW14508-MAY-WAT-LAY-005	SHEET 5 OF 7
JW14508-MAY-WAT-LAY-006	SHEET 6 OF 7
JW14508-MAY-WAT-LAY-007	SHEET 7 OF 7
JW14508-MAY-WAT-LAY-008	COORDINATE TABLE
WATER STANDARD DRAWINGS	
JW100-DET02-W01	BEDDING DETAIL
JW100-DET03-W01	TYPICAL VALVE BOX
JW100-DET04-W01	TYPICAL SCOUR VALVE
JW100-DET05-W01	TYPICAL TRUST BLOCK DETAILS
JW100-DET06-W01	FIRE HYDRANT DETAIL
JW100-DET07-W01	WATER ERF CONNECTION
JW100-DET08-W01	METERED FIRE CONNECTION
JW100-DET09-W01	ABOVE GROUND WATER METER
JW100-DET10-W01	PRV CHAMBER AND DETAILS
JW100-DET11-W01	TYPICAL BULK FLOW METER DETAIL
JW100-DET12-W01	DETAIL OF SERVICE MARKER

KEY PLAN



CONSULTING ENGINEERS
CAPEX - ENGINEERING SERVICE UNIT
TURBINE HALL - 3RD FLOOR
65 NTEMI PILISO STREET
NEWTOWN
JOHANNESBURG
2113

DESIGNED	T MOELA	DATE:	12/02/26
	SIGNATURE:		
DRAWN	K KOLBERG	DATE:	12/02/26
	SIGNATURE:		
CHECKED	T MOELA	DATE:	12/02/26
	SIGNATURE:		
APPROVED BY:	P MOGOLOLA	DATE:	
	SIGNATURE:	ECSA REG. No:	2018300335

Johannesburg Water

JOHANNESBURG WATER SOC Ltd
TURBINE HALL
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NEWTOWN
JOHANNESBURG
2113
TEL: +27 (0)11 688 1400
FAX: +27(0)11 688-1528

Municipality:

Joburg
a world class African city

Project description:

MAYFAIR WATER PIPE REPLECEMENT PROJECT
GENERAL LAYOUT

SCALE 1:1000

AMENDMENTS

REV	DESCRIPTION	DATE	BY	APV
A	ISSUED FOR PRELIMINARY DESIGN	9/17/2024	T.M	R.N
B	ISSUED FOR DETAIL DESIGN	2025/07/16	T.M	P.M
C	ISSUED FOR TENDER REPORT	2026/02/12	T.M	P.M

DRAWING No:JW14508-MAY-WAT-LAY-006

UR 1300		WAT	-	C	
PROJECT No.		DISCIPLINARY		REV.	
A1	SHEET	6	OF	8	
ORIGINAL PAGE SIZE					

FILE No.

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LEGEND

- : NEW HYDRANT
- : NEW HIGH IMPACT PIPE
- : NEW VALVE
- : EXISTING VALVE
- : EXISTING PIPE
- : EXISTING AIR VALVE
- : EXISTING BULK METER
- : PIPES TO BE DECOMMISSIONED
- No. : WATER NODE NUMBER
- : ROAD CROSSING (TRENCHLESS TECHNOLOGY)

NEW TIE IN CONNECTION FOR NEW 160Ø mPVC TO EXISTING 150Ø ST REFER TO DETAIL 7

NEW TIE IN CONNECTION FOR NEW 110Ø mPVC TO EXISTING 100Ø ST REFER TO DETAIL 9

DETAIL 7
SCALE N.T.S.

DETAIL 7 - FITTINGS TABLE

CONNECTION PIPE FITTINGS AND ITEM LIST

ITEM No.	DESCRIPTION	QUANTITY
1	DN1600 - 45° PRESSURE BEND WITH SOCKET JOINT ONE END - PLAIN OTHER END. 16 BAR WORKING PRESSURE	2
2	DN160Ø mPVC CLASS 16 DISTANCE PIPE PIECE VICTAULIC GROOVED ALL ENDS. ***note: Length of pipe to be determined on site by engineer.***	2
3	DN160Ø IRON ADAPTOR FROM PVC - STEEL, 16 BAR WORKING PRESSURE	1

ISSUED FOR TENDER REPORT

REFER TO DRAWING No:	
JW14508-MAY-WAT-LAY-000	GENERAL ARRANGEMENT LAYOUT
JW14508-MAY-WAT-LAY-001	SHEET 1 OF 7
JW14508-MAY-WAT-LAY-002	SHEET 2 OF 7
JW14508-MAY-WAT-LAY-003	SHEET 3 OF 7
JW14508-MAY-WAT-LAY-004	SHEET 4 OF 7
JW14508-MAY-WAT-LAY-005	SHEET 5 OF 7
JW14508-MAY-WAT-LAY-006	SHEET 6 OF 7
JW14508-MAY-WAT-LAY-007	SHEET 7 OF 7
JW14508-MAY-WAT-LAY-008	COORDINATE TABLE
WATER STANDARD DRAWINGS	
JW100-DET02-W01	BEDDING DETAIL
JW100-DET03-W01	TYPICAL VALVE BOX
JW100-DET04-W01	TYPICAL SCOUR VALVE
JW100-DET05-W01	TYPICAL TRUST BLOCK DETAILS
JW100-DET06-W01	FIRE HYDRANT DETAIL
JW100-DET07-W01	WATER ERF CONNECTION
JW100-DET08-W01	METERED FIRE CONNECTION
JW100-DET09-W01	ABOVE GROUND WATER METER
JW100-DET10-W01	PRV CHAMBER AND DETAILS
JW100-DET11-W01	TYPICAL BULK FLOW METER DETAIL
JW100-DET12-W01	DETAIL OF SERVICE MARKER

KEY PLAN



DRAWING No: JW14508-MAY-WAT-LAY-007

DESIGNED	T MOELA	DATE: 12/02/26	
	SIGNATURE:		
DRAWN	K KOLBERG	DATE: 12/02/26	
	SIGNATURE:		
CHECKED	T MOELA	DATE: 12/02/26	
	SIGNATURE:		
APPROVED BY:	P MOGOLOLA	DATE:	
	SIGNATURE:	2018300335 ECSA REG. No:	

CONSULTING ENGINEERS
CAPEX - ENGINEERING SERVICE UNIT
TURBINE HALL - 3RD FLOOR
65 NTEMI PILISO STREET
NEWTOWN
JOHANNESBURG
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Johannesburg Water

JOHANNESBURG WATER SOC Ltd
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NEWTOWN
JOHANNESBURG
2113
TEL: +27 (0)11 688 1400
FAX: +27(0)11 688-1528

Municipality: Joburg — a world class African city

Project description:

MAYFAIR WATER PIPE REPLECEMENT PROJECT
GENERAL LAYOUT

SCALE 1:1000

AMENDMENTS

REV	DESCRIPTION	DATE	BY	APV
A	ISSUED FOR PRELIMINARY DESIGN	9/17/2024	T.M	R.N
B	ISSUED FOR DETAIL DESIGN	2025/07/16	T.M	P.M
C	ISSUED FOR TENDER REPORT	2026/02/12	T.M	P.M

PROJECT No.	DISCIPLINARY	REV.
UR 1300	WAT	C

ORIGINAL PAGE SIZE: A1 — SHEET 7 OF 8

FILE No.

Coordinate List

Lo 29

Mayfair water-Upper

Node	YLo	XLo
Const:		
W1	99 294.642	2 899 068.933
W2	99 290.267	2 899 072.923
W3	99 448.409	2 899 093.947
W4	99 343.978	2 899 109.965
W5	99 348.247	2 899 111.765
W6	99 303.231	2 899 117.231
W7	99 298.392	2 899 118.586
W8	99 200.533	2 899 159.124
W9	99 339.041	2 899 196.605
W10	99 321.412	2 899 199.733
W11	99 313.094	2 899 201.209
W12	99 306.362	2 899 202.403
W13	99 213.957	2 899 218.797
W14	99 211.238	2 899 219.279
W15	99 198.645	2 899 221.514
W16	99 874.663	2 899 228.867
W17	99 107.070	2 899 237.760
W18	99 091.760	2 899 240.476
W19	99 513.872	2 899 247.483
W20	99 509.843	2 899 248.998
W21	98 999.191	2 899 256.900
W22	98 983.881	2 899 259.616
W23	98 952.459	2 899 265.190
W24	99 335.958	2 899 279.993
W25	99 327.361	2 899 281.525
W26	99 320.651	2 899 282.721
W27	98 986.719	2 899 289.081
W28	98 985.515	2 899 289.829
W29	98 885.652	2 899 290.600
W30	98 875.188	2 899 294.614
W31	98 864.901	2 899 298.531
W32	99 228.254	2 899 299.190
W33	99 212.949	2 899 301.918
W34	99 121.385	2 899 318.239
W35	99 106.077	2 899 320.966
W36	99 492.946	2 899 335.429
W37	99 013.520	2 899 337.466
W38	98 998.212	2 899 340.194
W39	99 459.621	2 899 341.359
W40	99 444.313	2 899 344.082
W41	98 903.954	2 899 356.995
W42	98 897.671	2 899 358.115
W43	98 888.647	2 899 359.724
W44	99 350.337	2 899 360.804
W45	99 341.605	2 899 361.439
W46	99 341.763	2 899 362.330
W47	99 335.028	2 899 363.528
W48	98 797.382	2 899 375.992
W49	98 557.325	2 899 378.290
W50	98 782.074	2 899 378.720
W51	99 242.631	2 899 379.969
W52	99 227.323	2 899 382.693
W53	98 684.107	2 899 396.182
W54	98 668.799	2 899 398.911
W55	99 135.754	2 899 398.987
W56	99 120.445	2 899 401.711
W57	99 524.497	2 899 412.951
W58	98 587.907	2 899 413.329
W59	98 572.051	2 899 419.933
W60	99 475.665	2 899 421.640
W61	98 565.240	2 899 422.769
W62	99 460.357	2 899 424.364
W63	98 557.697	2 899 425.910
W64	98 918.417	2 899 437.659
W65	98 912.034	2 899 438.795
W66	98 903.109	2 899 440.383
W67	99 364.690	2 899 441.386
W68	99 356.102	2 899 442.914
W69	99 349.382	2 899 444.110
W70	98 811.839	2 899 456.623
W71	98 796.530	2 899 459.347
W72	99 256.984	2 899 460.551
W73	99 241.676	2 899 463.275
W74	98 698.559	2 899 476.780
W75	98 683.250	2 899 479.504
W76	99 150.107	2 899 479.568
W77	99 134.799	2 899 482.294
W78	99 565.948	2 899 486.179
W79	98 586.490	2 899 496.721
W80	98 578.646	2 899 498.116
W81	99 042.236	2 899 498.762
W82	98 571.177	2 899 499.445
W83	99 488.775	2 899 499.912
W84	99 026.923	2 899 501.467
W85	99 473.467	2 899 502.637
W86	98 241.265	2 899 503.195
W87	98 359.535	2 899 505.765
W88	98 360.385	2 899 508.078
W89	98 477.948	2 899 516.034
W90	98 930.832	2 899 518.585
W91	98 462.639	2 899 518.758
W92	98 926.379	2 899 519.377
W93	99 379.022	2 899 519.444
W94	99 695.442	2 899 520.197

Coordinate List

Lo 29

Mayfair water-Upper

Node	YLo	XLo
Const:		
W95	99 370.005	2 899 521.049
W96	98 915.525	2 899 521.308
W97	99 363.713	2 899 522.168
W98	98 365.360	2 899 536.068
W99	98 825.750	2 899 537.283
W100	99 271.308	2 899 538.613
W101	98 810.443	2 899 540.006
W102	99 691.859	2 899 541.254
W103	99 256.007	2 899 541.335
W104	98 249.831	2 899 551.297
W105	98 712.471	2 899 557.439
W106	99 164.439	2 899 557.631
W107	98 298.675	2 899 559.968
W108	98 697.161	2 899 560.163
W109	98 149.130	2 899 560.355
W110	98 212.506	2 899 566.787
W111	98 213.452	2 899 569.084
W112	99 573.466	2 899 570.517
W113	98 591.690	2 899 571.426
W114	99 056.571	2 899 576.827
W115	98 600.397	2 899 577.381
W116	99 041.260	2 899 579.552
W117	98 585.088	2 899 580.105
W118	98 092.472	2 899 580.979
W119	99 502.591	2 899 583.128
W120	99 497.431	2 899 584.046
W121	99 487.282	2 899 585.852
W122	98 140.945	2 899 586.511
W123	98 491.124	2 899 589.320
W124	98 475.815	2 899 592.044
W125	98 149.610	2 899 592.900
W126	98 150.062	2 899 595.439
W127	98 945.167	2 899 596.652
W128	98 491.766	2 899 596.710
W129	98 940.289	2 899 597.520
W130	98 929.856	2 899 599.377
W131	98 476.460	2 899 599.434
W132	99 395.998	2 899 602.095
W133	99 384.506	2 899 602.552
W134	99 377.700	2 899 602.822
W135	99 377.617	2 899 602.829
W136	98 098.701	2 899 614.118
W137	98 838.587	2 899 615.619
W138	98 383.976	2 899 615.889
W139	98 823.278	2 899 618.343
W140	98 368.669	2 899 618.613
W141	99 288.013	2 899 618.772
W142	99 269.907	2 899 621.993
W143	98 274.603	2 899 627.847
W144	98 259.295	2 899 630.571
W145	99 567.668	2 899 631.193
W146	98 275.788	2 899 635.140
W147	98 725.307	2 899 635.778
W148	99 181.145	2 899 637.786
W149	98 260.347	2 899 637.888
W150	98 709.996	2 899 638.502
W151	99 514.196	2 899 640.707
W152	99 163.033	2 899 641.009
W153	99 507.707	2 899 641.860
W154	99 498.887	2 899 643.431
W155	98 164.706	2 899 647.402
W156	98 166.841	2 899 654.526
W157	98 160.769	2 899 655.606
W158	98 613.235	2 899 655.722
W159	99 073.274	2 899 656.979
W160	98 151.533	2 899 657.249
W161	98 597.926	2 899 658.447
W162	99 404.986	2 899 660.139
W163	99 055.162	2 899 660.202
W164	99 395.069	2 899 661.904
W165	99 389.676	2 899 662.864
W166	98 101.023	2 899 666.237
W167	98 506.675	2 899 674.685
W168	98 961.871	2 899 676.801
W169	98 491.366	2 899 677.410
W170	98 954.632	2 899 678.089
W171	99 297.279	2 899 675.304
W172	98 943.758	2 899 680.024
W173	99 281.969	2 899 682.028
W174	98 396.815	2 899 694.236
W175	98 655.293	2 899 695.764
W176	98 381.509	2 899 696.960
W177	99 190.402	2 899 698.321
W178	98 837.179	2 899 698.987
W179	99 175.093	2 899 701.045
W180	98 287.660	2 899 713.661
W181	98 265.620	2 899 714.024
W182	98 742.010	2 899 715.920
W183	98 272.352	2 899 716.385
W184	99 082.530	2 899 717.515
W185	98 723.899	2 899 719.142
W186	99 087.221	2 899 720.239
W187	98 174.679	2 899 733.767
W188	98 629.937	2 899 735.860

Coordinate List

Lo 29

Mayfair water-Upper

Node	YLo	XLo
Const:		
W189	98 971.126	2 899 737.338
W190	98 965.362	2 899 738.363
W191	98 611.826	2 899 739.083
W192	98 955.817	2 899 740.062
W193	98 520.866	2 899 755.267
W194	98 864.548	2 899 756.302
W195	98 505.559	2 899 757.960
W196	98 849.241	2 899 759.025
W197	98 413.519	2 899 774.367
W198	98 751.267	2 899 776.458
W199	98 395.405	2 899 777.590
W200	98 735.958	2 899 779.182
W201	98 184.447	2 899 788.660
W202	98 299.954	2 899 794.573
W203	98 639.193	2 899 796.400
W204	98 623.887	2 899 799.124
W205	98 214.644	2 899 809.752
W206	98 530.547	2 899 815.732
W207	98 515.239	2 899 818.456
W208	98 422.774	2 899 834.908
W209	98 407.465	2 899 837.632
W210	98 358.598	2 899 838.336
W211	98 375.474	2 899 843.325
W212	98 322.014	2 899 845.029

Pipe Data List

Node	Node	Length (m)	Dia. (mm)	MATERIAL	CLASS
Mayfair water-Upper					
W1	W6	49.06	110	mPVC	16
W2	W7	46.38	250	mPVC	16
W3	W5	101.73	110	mPVC	16
W4	W5	4.63	110	mPVC	16
W4	W6	41.39	110	mPVC	16
W6	W7	5.02	110	mPVC	16
W7	W8	105.92	110	mPVC	16
W7	W11	83.92	250	mPVC	16
W8	W14	61.10	110	mPVC	16
W9	W10	17.90	110	PE100 HDPE	PN16
W10	W11	8.45	110	PE100 HDPE	PN16
W11	W12	6.84	110	PE100 HDPE	PN16
W11	W25	81.58	250	mPVC	16
W12	W13	93.85	110	mPVC	16
W13	W14	2.76	110	PE100 HDPE	PN16
W14	W15	12.79	110	PE100 HDPE	PN16
W15	W17	93.00	110	mPVC	16
W16	W28	61.92	110	mPVC	16
W17	W18	15.55	110	PE100 HDPE	PN16
W18	W21	94.02	110	mPVC	16
W19	W20	4.31	110	PE100 HDPE	PN16
W20	W24	176.63	110	mPVC	16
W21	W22	15.55	110	PE100 HDPE	PN16
W22	W23	31.91	110	mPVC	16
W22	W27	67.13	110	mPVC	16
W24	W25	8.73	110	PE100 HDPE	PN16
W25	W26	6.82	110	PE100 HDPE	PN16
W25	W45	81.17	250	mPVC	16
W26	W32	93.85	110	mPVC	16
W27	W29	4.34	110	PE100 HDPE	PN16
W28	W29	0.78	110	mPVC	16
W29	W30	11.21	110	PE100 HDPE	PN16
W29	W42	68.58	110	mPVC	16
W30	W31	11.01	110	PE100 HDPE	PN16
W32	W33	15.55	110	PE100 HDPE	PN16
W33	W34	93.01	110	mPVC	16
W34	W35	15.55	110	PE100 HDPE	PN16
W35	W37	94.02	110	mPVC	16
W36	W39	33.85	110	mPVC	16
W37	W38	15.55	110	PE100 HDPE	PN16
W38	W41	95.74	110	mPVC	16
W39	W40	15.55	110	PE100 HDPE	PN16
W40	W44	95.45	110	mPVC	16
W41	W42	6.38	110	PE100 HDPE	PN16
W42	W43	9.17	110	PE100 HDPE	PN16
W42	W65	81.95	110	mPVC	16
W43	W48	92.70	110	mPVC	16
W44	W46	8.71	110	PE100 HDPE	PN16
W45	W46	0.90	250	mPVC	16
W46	W47	6.84	110	PE100 HDPE	PN16
W46	W68	81.85	250	mPVC	16
W47	W51	93.85	110	mPVC	16
W48	W50	15.55	110	PE100 HDPE	PN16
W49	W61	45.18	250	mPVC	16
W50	W53	99.51	110	mPVC	16
W51	W52	15.55	110	PE100 HDPE	PN16
W52	W55	93.01	110	mPVC	16
W53	W54	15.55	110	PE100 HDPE	PN16
W54	W58	82.17	110	mPVC	16
W55	W56	15.55	110	PE100 HDPE	PN16
W56	W64	205.20	110	mPVC	16
W57	W60	49.60	110	mPVC	16
W58	W59	17.18	110	mPVC	16
W59	W61	7.38	110	PE100 HDPE	PN16
W60	W62	15.55	110	PE100 HDPE	PN16
W61	W63	8.17	110	PE100 HDPE	PN16
W62	W67	97.17	110	mPVC	16
W63	W88	213.74	110	mPVC	16
W64	W65	6.48	110	PE100 HDPE	PN16
W65	W66	9.07	110	PE100 HDPE	PN16
W65	W92	81.85	110	mPVC	16
W66	W70	92.70	110	mPVC	16
W67	W69	15.55	110	PE100 HDPE	PN16
W68	W95	79.36	250	mPVC	16
W69	W72	93.85	110	mPVC	16
W70	W71	15.55	110	PE100 HDPE	PN16
W71	W74	99.51	110	mPVC	16
W72	W73	15.55	110	PE100 HDPE	PN16
W73	W76	93.01	110	mPVC	16
W74	W75	15.55	110	PE100 HDPE	PN16
W75	W79	98.28	110	mPVC	16
W76	W77	15.56	110	PE100 HDPE	PN16
W77	W81	94.01	110	mPVC	16
W78	W83	78.38	110	mPVC	16
W79	W80	7.97	110	PE100 HDPE	PN16
W80	W82	7.59	110	PE100 HDPE	PN16
W80	W113	74.46	250	mPVC	16
W81	W84	15.55	110	PE100 HDPE	PN16
W82	W89	94.69	110	mPVC	16
W83	W85	15.55	110	PE100 HDPE	PN16
W84	W90	97.60	110	mPVC	16
W85	W93	95.93	110	mPVC	16
W86	W104	48.86	110	mPVC	16
W87	W104	118.78	110	mPVC	16
W89	W91	15.55	110	PE100 HDPE	PN16

Pipe Data List

Node	Node	Length (m)	Dia. (mm)	MATERIAL	CLASS
Mayfair water-Upper					
W90	W92	4.52	110	PE100 HDPE	PN16
W91	W98	98.81	110	mPVC	16
W92	W96	11.02	110	PE100 HDPE	PN16
W92	W128	79.37	110	mPVC	16
W93	W95	9.16	110	PE100 HDPE	PN16
W94	W102	22.01	110	mPVC	16
W95	W97	6.39	110	PE100 HDPE	PN16
W95	W133	82.78	250	mPVC	16
W96	W99	91.18	110	mPVC	16
W97	W100	93.86	110	mPVC	16
W99	W101	15.55	110	PE100 HDPE	PN16
W100	W103	15.54	110	PE100 HDPE	PN16
W101	W105	99.51	110	mPVC	16
W102	W112	121.96	110	mPVC	16
W103	W106	93.01	110	mPVC	16
W104	W110	40.41	110	mPVC	16
W105	W108	15.55	110	PE100 HDPE	PN16
W106	W109	15.55	110	PE100 HDPE	PN16
W107	W110	7.38	110	PE100 HDPE	PN16
W107	W122	74.42	110	mPVC	16
W108	W115	98.28	110	mPVC	16
W109	W114	94.01	110	mPVC	16
W110	W111	2.49	110	PE100 HDPE	PN16
W111	W126	68.66	110	mPVC	16
W112	W119	71.99	110	mPVC	16
W113	W123	102.15	250	mPVC	16
W114	W116	15.55	110	PE100 HDPE	PN16
W115	W117	15.55	110	PE100 HDPE	PN16
W116	W127	97.60	110	mPVC	16
W117	W128	94.79	110	mPVC	16
W118	W136	33.72	110	mPVC	16
W119	W120	5.24	110	PE100 HDPE	PN16
W120	W121	10.31	110	PE100 HDPE	PN16
W120	W153	56.72	110	mPVC	16
W121	W132	92.72	110	mPVC	16
W123	W124	15.55	250	PE100 HDPE	PN16
W124	W143	204.37	250	mPVC	16
W125	W126	2.58	110	PE100 HDPE	PN16
W125	W136	55.15	110	mPVC	16
W126	W157	61.11	110	mPVC	16
W127	W129	4.95	110	PE100 HDPE	PN16
W128	W131	15.55	110	PE100 HDPE	PN16
W129	W130	10.60	110	PE100 HDPE	PN16
W129	W170	81.84	110	mPVC	16
W130	W137	92.70	110	mPVC	16
W131	W138	93.93	110	mPVC	16
W132	W133	11.50	110	PE100 HDPE	PN16
W133	W134	6.81	110	PE100 HDPE	PN16
W133	W164	60.28	250	mPVC	16
W135	W143	91.01	110	mPVC	16
W137	W139	15.55	110	PE100 HDPE	PN16
W138	W140	15.55	110	PE100 HDPE	PN16
W139	W147	99.51	110	mPVC	16
W140	W146	94.34	110	mPVC	16
W141	W142	18.39	110	PE100 HDPE	PN16
W142	W148	90.16	110	mPVC	16
W143	W144	15.55	250	PE100 HDPE	PN16
W144	W155	96.07	250	mPVC	16
W145	W151	54.31	110	mPVC	16
W146	W149	15.68	110	PE100 HDPE	PN16
W147	W150	15.55	110	PE100 HDPE	PN16
W148	W152	18.40	110	PE100 HDPE	PN16
W149	W156	94.97	110	mPVC	16
W150	W158	98.28	110	mPVC	16
W151	W153	6.59	110	PE100 HDPE	PN16
W152	W159	91.17	110	mPVC	16
W153	W154	8.96	110	PE100 HDPE	PN16
W154	W162	95.38	110	mPVC	16
W156	W157	6.17	110	PE100 HDPE	PN16
W157	W160	9.38	110	PE100 HDPE	PN16
W157	W187	79.39	110	mPVC	16
W158	W161	15.55	110	PE100 HDPE	PN16
W159	W163	18.40	110	PE100 HDPE	PN16
W160	W166	51.30	110	mPVC	16
W161	W167	92.69	110	mPVC	16
W162	W164	10.07	110	PE100 HDPE	PN16
W163	W168	94.76	110	mPVC	16
W164	W165	5.48	110	PE100 HDPE	PN16
W165	W171	93.85	110	mPVC	16
W167	W169	15.55	110	PE100 HDPE	PN16
W168	W170	7.35	110	PE100 HDPE	PN16
W169	W174	96.04	110	mPVC	16
W170	W172	11.05	110	PE100 HDPE	PN16
W170	W190	61.22	110	mPVC	16
W171	W173	15.55	110	PE100 HDPE	PN16
W172	W175	89.85	110	mPVC	16
W173	W177	93.01	110	mPVC	16
W174	W176	15.55	110	PE100 HDPE	PN16
W175	W178	18.40	110	PE100 HDPE	PN16
W176	W180	95.32	110	mPVC	16
W177	W179	15.55	110	PE100 HDPE	PN16
W178	W182	96.66	110	mPVC	16
W179	W184	94.02	110	mPVC	16
W180	W181	2.07	110	PE100 HDPE	PN16
W181	W183	13.48	110	PE100 HDPE	PN16
W181	W202	81.81	110	mPVC	16

Pipe Data List

Node	Node	Length (m)	Dia. (mm)	MATERIAL	CLASS
Mayfair water-Upper					
W182	W185	18.40	110	PE100 HDPE	PN16
W183	W187	99.21	110	mPVC	16
W184	W186	15.55	110	PE100 HDPE	PN16
W185	W188	95.44	110	mPVC	16
W186	W189	97.60	110	mPVC	16
W187	W201	55.76	110	mPVC	16
W188	W191	18.40	110	PE100 HDPE	PN16
W189	W190	5.85	110	PE100 HDPE	PN16
W190	W192	9.69	110	PE100 HDPE	PN16
W191	W193	92.39	110	mPVC	16
W192	W194	92.70	110	mPVC	16
W193	W195	15.55	110	PE100 HDPE	PN16
W194	W196	15.55	110	PE100 HDPE	PN16
W195	W197	93.49	110	mPVC	16
W196	W198	99.51	110	mPVC	16
W197	W199	18.40	110	PE100 HDPE	PN16
W198	W200	15.55	110	PE100 HDPE	PN16
W199	W205	183.60	110	mPVC	16
W200	W203	98.28	110	mPVC	16
W201	W205	36.83	110	mPVC	16
W203	W204	15.55	110	PE100 HDPE	PN16
W204	W206	94.81	110	mPVC	16
W206	W207	15.55	110	PE100 HDPE	PN16
W207	W208	93.92	110	mPVC	16
W208	W209	15.55	110	PE100 HDPE	PN16
W209	W211	32.49	110	mPVC	16
W210	W211	17.60	110	mPVC	16
W210	W212	37.19	110	mPVC	16

PIPE MATERIAL LIST

Diameter (mm)	Class	Length (m)
PE100 HDPE		
250	PN16	31.10
110	PN16	1112.48
mPVC		
250	16	1196.99
110	16	9067.24
Total length :		11407.81

Coordinate List

Lo 29

Mayfair Lower

Node	YLo	XLo
Const:		
W213	99 510.287	2 899 656.377
W214	99 599.286	2 899 664.556
W215	99 593.720	2 899 664.608
W216	99 523.001	2 899 697.190
W217	99 517.709	2 899 698.132
W218	99 507.695	2 899 699.914
W219	99 415.298	2 899 716.354
W220	99 399.989	2 899 719.077
W221	99 306.199	2 899 735.765
W222	99 290.892	2 899 738.489
W223	99 198.301	2 899 755.347
W224	99 616.685	2 899 756.702
W225	99 182.993	2 899 759.071
W226	99 605.683	2 899 760.661
W227	99 539.689	2 899 772.403
W228	99 531.179	2 899 773.917
W229	99 089.421	2 899 774.332
W230	99 524.381	2 899 775.127
W231	99 074.113	2 899 777.059
W232	99 431.984	2 899 791.566
W233	98 978.700	2 899 794.035
W234	99 416.675	2 899 794.290
W235	98 963.391	2 899 796.759
W236	99 322.865	2 899 810.977
W237	98 871.761	2 899 813.063
W238	99 307.577	2 899 813.701
W239	98 865.175	2 899 814.234
W240	98 856.453	2 899 815.786
W241	98 527.751	2 899 822.452
W242	98 512.719	2 899 825.127
W243	98 771.619	2 899 828.345
W244	99 214.629	2 899 829.893
W245	98 761.017	2 899 830.231
W246	98 775.258	2 899 830.233
W247	98 760.346	2 899 830.351
W248	99 199.189	2 899 832.640
W249	98 745.709	2 899 832.955
W250	99 636.477	2 899 838.313
W251	98 409.165	2 899 843.553
W252	99 105.830	2 899 849.596
W253	98 649.082	2 899 850.145
W254	99 090.524	2 899 852.320
W255	98 633.773	2 899 852.869
W256	99 552.830	2 899 853.195
W257	99 545.502	2 899 854.499
W258	99 537.522	2 899 855.919
W259	98 995.385	2 899 869.247
W260	98 539.564	2 899 869.630
W261	98 535.760	2 899 870.306
W262	98 980.077	2 899 871.971
W263	98 524.253	2 899 872.353
W264	99 445.124	2 899 872.358
W265	99 429.816	2 899 875.082
W266	98 417.983	2 899 882.993
W267	98 888.446	2 899 888.274
W268	98 678.632	2 899 890.020
W269	98 673.138	2 899 890.997
W270	98 419.406	2 899 891.007
W271	99 336.026	2 899 891.769
W272	99 320.718	2 899 894.492
W273	99 650.792	2 899 906.781
W274	98 778.140	2 899 907.900
W275	98 774.271	2 899 908.588
W276	99 217.326	2 899 910.352
W277	98 762.011	2 899 910.769
W278	99 227.101	2 899 911.148
W279	99 212.737	2 899 911.168
W280	99 220.545	2 899 912.315
W281	98 214.787	2 899 919.078
W282	98 205.206	2 899 920.779
W283	98 199.476	2 899 921.797
W284	99 557.734	2 899 923.318
W285	98 665.760	2 899 927.895
W286	99 118.323	2 899 927.967
W287	98 650.452	2 899 930.618
W288	99 103.016	2 899 930.691
W289	98 108.065	2 899 938.030
W290	98 105.763	2 899 938.439
W291	98 090.670	2 899 939.061
W292	99 041.761	2 899 941.590
W293	97 981.137	2 899 941.972
W294	97 986.139	2 899 942.283
W295	97 996.661	2 899 942.935
W296	97 968.462	2 899 943.804
W297	99 041.701	2 899 944.139
W298	98 556.586	2 899 947.319
W299	98 548.665	2 899 947.405
W300	99 008.526	2 899 950.043
W301	98 541.277	2 899 950.043
W302	98 993.218	2 899 952.767
W303	98 446.214	2 899 966.957
W304	98 901.588	2 899 969.075
W305	98 430.905	2 899 969.680
W306	98 892.942	2 899 970.607

Coordinate List

Lo 29

Mayfair Lower

Node	YLo	XLo
Const:		
W307	98 886.281	2 899 971.799
W308	98 337.909	2 899 986.226
W309	98 791.283	2 899 988.706
W310	98 322.603	2 899 988.950
W311	98 788.615	2 899 989.181
W312	98 775.675	2 899 991.430
W313	98 229.712	2 900 005.477
W314	98 214.405	2 900 008.201
W315	98 678.904	2 900 008.706
W316	98 663.596	2 900 011.431
W317	98 121.884	2 900 024.662
W318	98 106.311	2 900 027.433
W319	98 569.731	2 900 028.136
W320	98 095.104	2 900 028.451
W321	98 565.475	2 900 028.893
W322	98 554.422	2 900 030.861
W323	98 029.363	2 900 041.124
W324	98 461.372	2 900 047.421
W325	98 015.886	2 900 048.319
W326	98 914.013	2 900 050.000
W327	98 446.066	2 900 050.145
W328	98 898.707	2 900 052.723
W329	98 002.407	2 900 055.513
W330	98 353.535	2 900 066.613
W331	98 806.095	2 900 069.204
W332	98 338.226	2 900 069.337
W333	98 802.957	2 900 069.763
W334	98 790.788	2 900 071.928
W335	98 244.771	2 900 085.970
W336	98 229.462	2 900 088.694
W337	98 691.357	2 900 089.622
W338	98 676.049	2 900 092.346
W339	98 135.178	2 900 105.474
W340	98 119.874	2 900 108.198
W341	98 579.614	2 900 109.472
W342	99 034.725	2 900 111.656
W343	98 012.675	2 900 127.247
W344	98 930.267	2 900 130.244
W345	98 914.958	2 900 132.968
W346	98 362.406	2 900 145.608
W347	98 349.568	2 900 147.893
W348	98 820.152	2 900 149.837
W349	98 817.300	2 900 150.345
W350	98 804.844	2 900 152.561
W351	98 258.459	2 900 164.105
W352	98 243.152	2 900 166.829
W353	98 706.679	2 900 170.029
W354	98 691.371	2 900 172.753
W355	98 151.030	2 900 183.222

4800

3457

1247

96

97

2400

ANOTHER JOHANNESBURG WATER SERVICE DELIVERY PROJECT

HELPDESK (011)375-5555

Joburg

A world class African City

Johannesburg Water

PROJECT DETAILS:

CONTRACT NO.: JW.....

DESCRIPTION:- .....

FONT : 70mm

FONT : 60mm
SPACING : 60mm

780

CONSULTANT:

JOHANNESBURG WATER

DESIGN SECTION

TEL: 011 688 1400

FONT : 70mm

FONT : 50mm
SPACING : 50mm

540

CONTRACTOR:

.....

TEL.....

FONT : 70mm

FONT : 50mm
SPACING : 50mm

540

CLIENT

JOHANNESBURG WATER-

INVESTMENT DELIVERY

TEL: 011 688 1400

FONT : 70mm

FONT : 50mm
SPACING : 50mm

540

CONSULTING ENGINEERS
CAPEX DESIGN SECTION
SWISS HOUSE
7TH FLOOR

DESIGNED	B.M.KHUMALO	MAY 2017	
DRAWN	B.M.KHUMALO	MAY 2017	
CHECKED	J.GUMBO	DATE 18/7/17	
	SIGNATURE		
	ECSA REG. No.	20137ec44	
APPROVED BY	T.MPANDAGUTA	DATE	
	SIGNATURE		
	ECSA REG. No.	20170150	

Johannesburg Water

17 HARRISON STREET
MARSHALLTOWN
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TEL: (011) 688-1400

FAX: (011) 688-1529

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STANDARD DETAIL
NAMEBOARD

AMENDMENTS

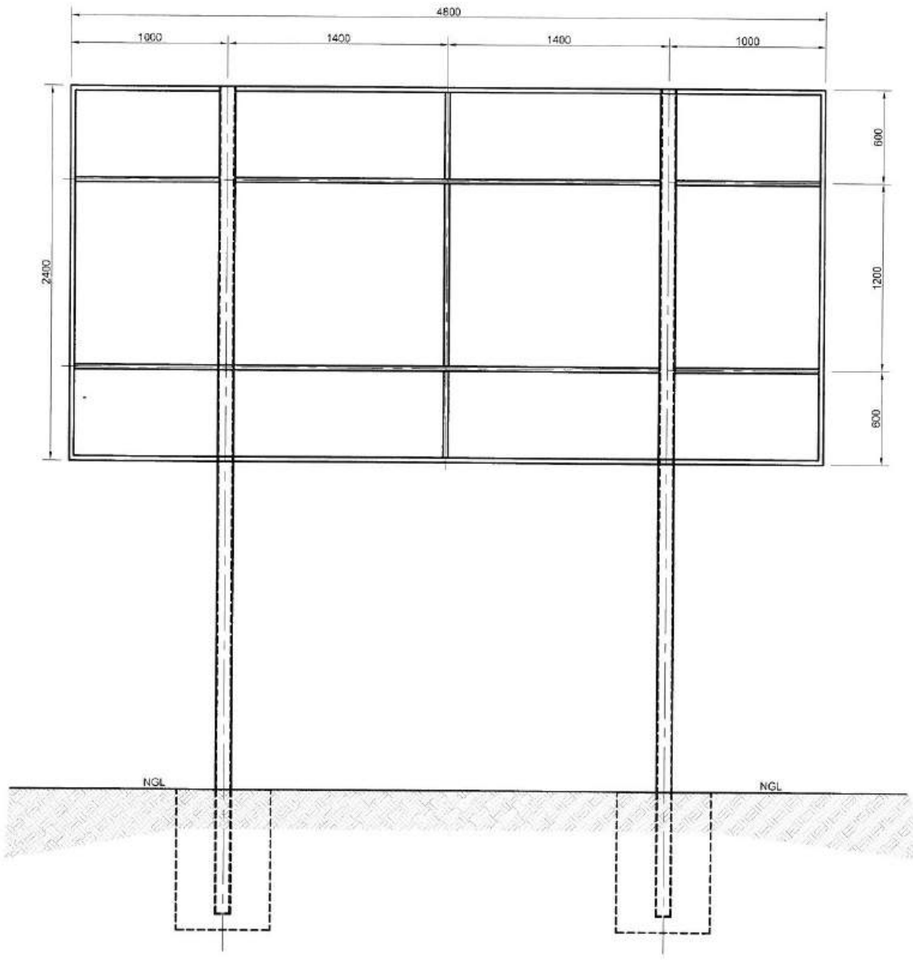
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DRAWING No.JW100-DET01-W01

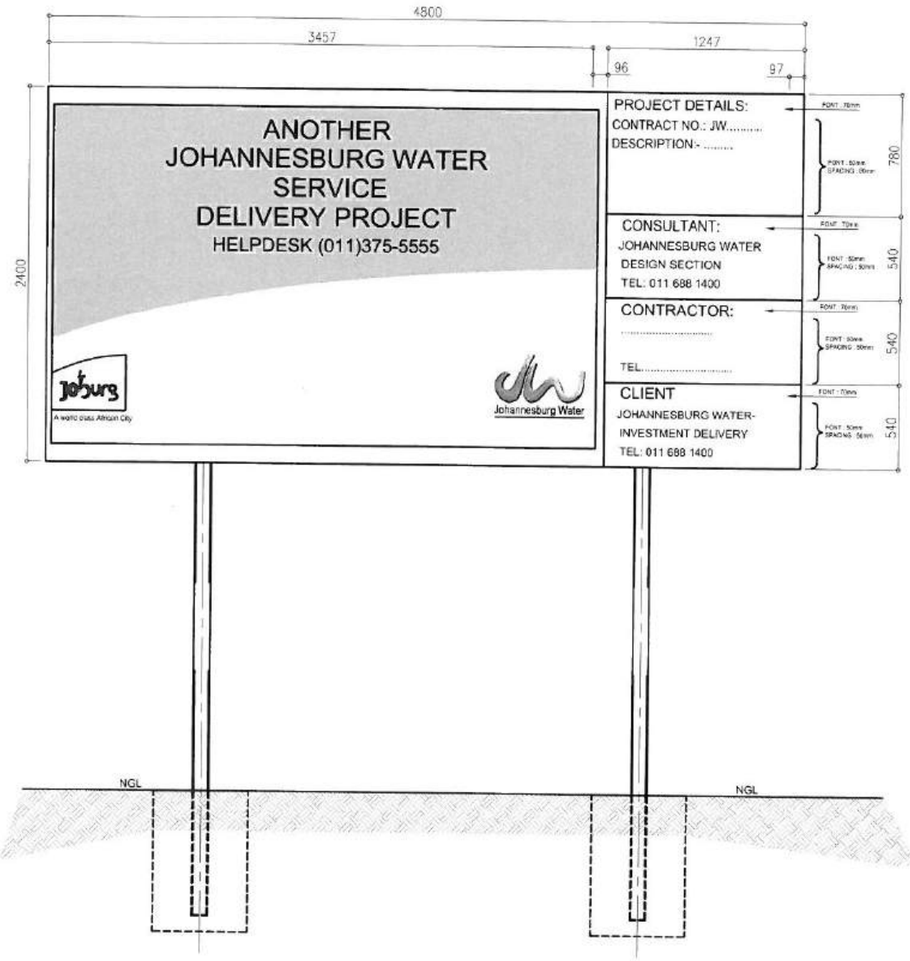
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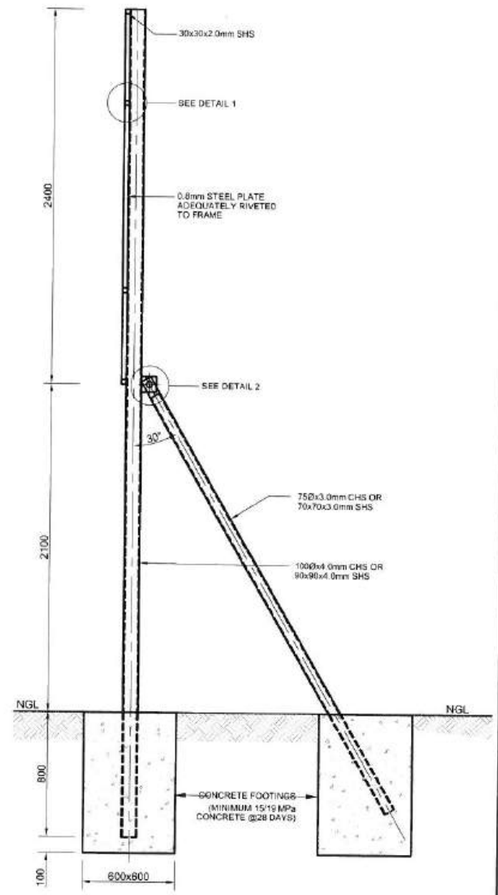
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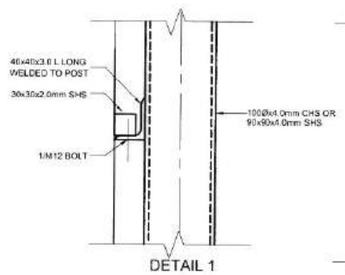
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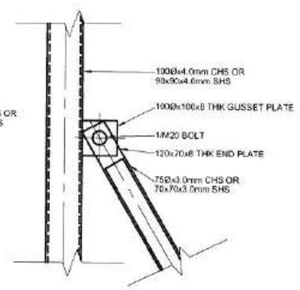
FRONT ELEVATION



TYPICAL SECTION



DETAIL 1



DETAIL 2

NOTE:
ALL WELDS TO BE 6mm FILLET
WELD ALL AROUND UNLESS
OTHERWISE SPECIFIED

CONSULTING ENGINEERS
CAPEX DESIGN SECTION
SWISS HOUSE
7TH FLOOR

DESIGNED	B.MUKHUMALO	MAY 2017	
DRAWN	B.MUKHUMALO	MAY 2017	
CHECKED	J.GUMBO	DATE: 19/7/17	
	SIGNATURE:		
	ECSA REG. No: 20137180144		
APPROVED BY:	T.MPANDAGUTA	DATE:	
	SIGNATURE:		
	ECSA REG. No: 20170150		

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STANDARD DETAIL
NAMEBOARD HOLDER

AMENDMENTS

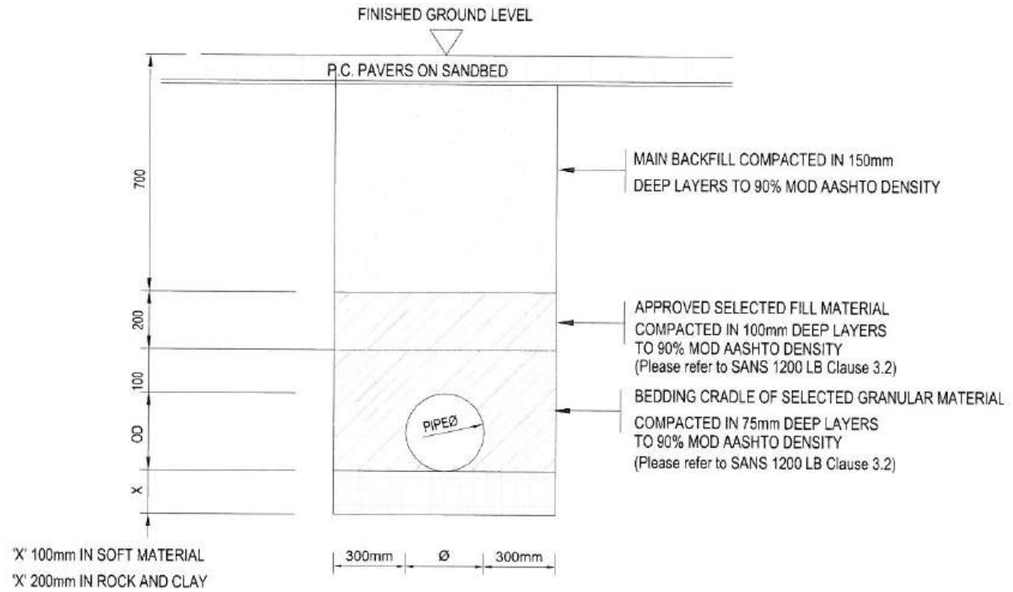
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PROJECT No. | REV.

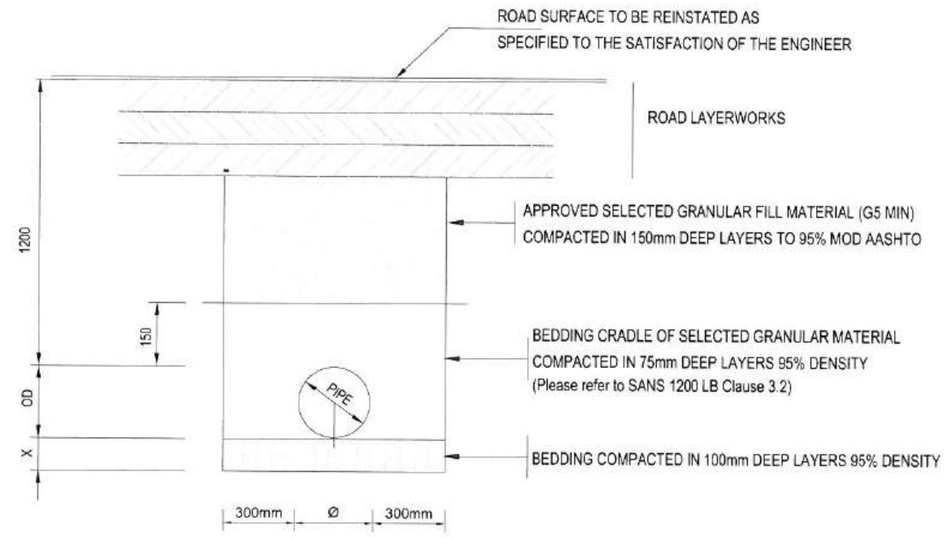
A3 ORIGINAL PAGE SIZE | SHEET 01 OF

FILE No.



'X' 100mm IN SOFT MATERIAL
'X' 200mm IN ROCK AND CLAY

TYPICAL TRENCH SECTION ACROSS PAVED WALKWAYS AND OPEN GROUND



'X' 100mm IN SOFT MATERIAL
'X' 200mm IN ROCK AND CLAY

TYPICAL TRENCH SECTION BENEATH ROAD

NOTES:

1. PIPE SIDE ALLOWANCE OF 300mm TYPICAL FOR UP TO 700mm Dia.
FOR PIPES GREATER THAN 700mm REFER TO SANS 1200DB CLUASES 5.2
"MINIMUM BASE WIDTHS."
2. COMPATION OF MAIN FILL TO MINIMUM MOD AASHTO OR THAT OF
SURROUNDING IN SITU UNDISTURBED GROUND AND AS DIRECTED BY THE ENGINEER.
3. DIMENSIONS IN MILLIMETERS (mm)
4. REFER ALSO TO JRA AND OTHER SERVICE PROVIDERS SPECIFICATIONS FOR BEDDING
DETAILS IN ROAD RESERVES OR WHERE THE PIPE INTERSECT WITH OTHER SERVICES.

CONSULTING ENGINEERS
CAPEX DESIGN SECTION
SWISS HOUSE
7TH FLOOR

DESIGNED	B.M.KHUVALO	MAY 2017
DRAWN	B.M.KHUVALO	MAY 2017
CHECKED	J.GUMBO	DATE 19/7/17
	SIGNATURE	
	ECSA REG. No.	20137004
APPROVED BY	T.MPANDAGUTA	DATE
	SIGNATURE	
	ECSA REG. No.	20170158

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STANDARD DETAIL
WATER BEDDING DETAILS

AMENDMENTS				
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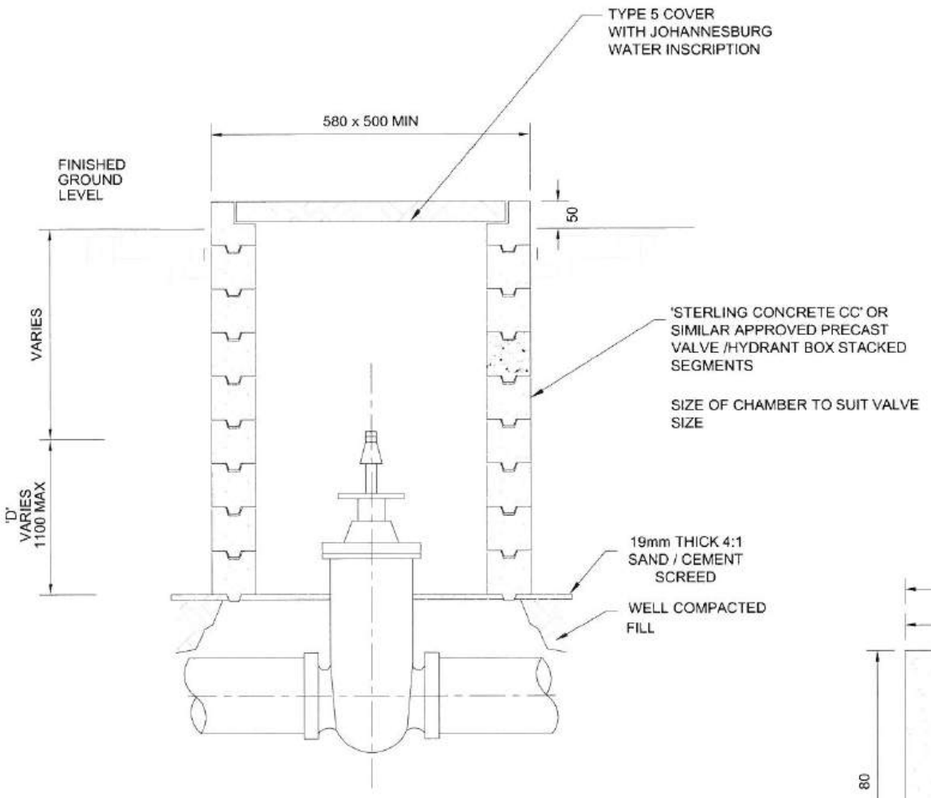
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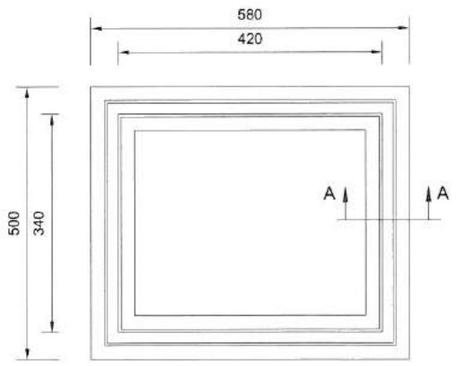
PROJECT No. | REV.

A3 | SHEET 2 OF

ORIGINAL PAGE SIZE

FILE No.





PLAN VIEW
VALVE AND HYDRANT BOX (MINIMUM SIZE)

SECTION A-A (1 PRECAST SEGMENT)

NOTES

a) VALVES UP TO 350mm N.B.

1) RESILIENT SEAL GATE VALVE (80mm UP TO 150mm N.B)
2) WEDGE TYPE GATE VALES (200mm UP TO 350mm N.B.
3) NON RISING SPINDLE
4) ANTI CLOCKWISE CLOSING, EXCEPT IN MIDRAND AREA - CLOCKWISE CLOSING.
5) SPECIFICATIONS TO SANS 664 AND SPECIFICATIONS IN ANNEXURE E OF THE JW STANDARDS GUIDELINES.

b) PRECAST SEGMENT SPECIFICATIONS

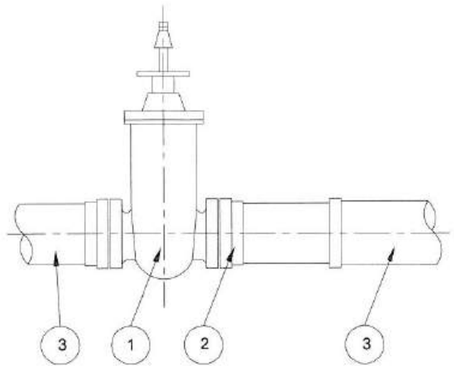
1) ALL MANHOLE SEGMENTS ACCORDING TO SANS 1294-1981
2) TOP SURFACE OF MANHOLE COVER TO BE 50 mm ABOVE THE FINISHED GROUND LEVEL EXCEPT IN PAVED AREAS
3) SEGMENTS TO BE DRY STACKED

c) ISOLATION VALVE

ALL VALVES SHALL BE FLANGED.

1) VICTAULIC VALVES AND FITTINGS MAY BE USED AS AN ALTERNATIVE TO THE PROPOSED ASSEMBLY.
2) WRITTEN PERMISSION FROM THE ENGINEER MUST BE OBTAINED FOR THE INSTALLATION OF ALTERNATIVES.
3) THE INSTALLATION MUST BE OF SUCH A NATURE THAT THE REMOVAL OF VALVES AND FITTINGS, FOR MAINTENANCE PURPOSES, CAN EASILY BE EXECUTED.

2 x 3 mmØ MILD STEEL RIENFORCING BARS
(15mm MINIMUM COVER)



TYPICAL VALVE ASSEMBLY

SCHEDULE

1. FLANGED RESILIENT WEDGE TYPE GATE VALVE
2. FLANGE ADAPTOR COMPATIBLE TO BOTH uPVC/HDPE PIPES
3. uPVC /HDPE PIPE

NOTE: 28 DAYS CONCRETE STRENGTH TO BE 25 MPa

TYPICAL VALVE BOXES FOR VALVES NOT EXCEEDING 350mm N.B.

CONSULTING ENGINEERS
CAPEX DESIGN SECTION
SWISS HOUSE
7TH FLOOR

DESIGNED	B MKHUMALO	MAY 2017	
DRAWN	B MKHUMALO	MAY 2017	
CHECKED	J DUMBO	DATE 20170644	
	SIGNATURE		
	ECSA REG. No.	20170644	
APPROVED BY:	T MPANDAGUTA	DATE	
	SIGNATURE		
	ECSA REG. No.	20170150	

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STANDARD DETAIL
TYPICAL VALVE BOXES FOR VALVES NOT EXCEEDING 350mm N.B.

AMENDMENTS

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DRAWING No.JW100-DET03-W01

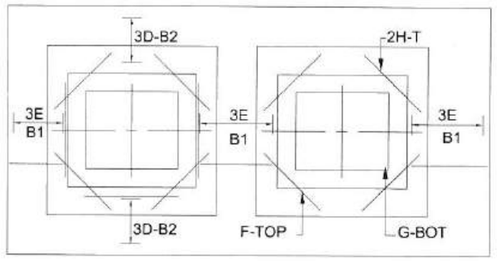
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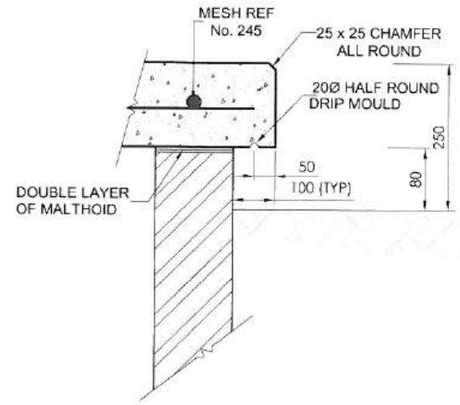
F.I.E. No.

ITEM	No.	MARK	No.	TOT. No.	DIA.	c/c	LENGTH	SHAPE CODE	A	B	C	D	E/r
	COVER SLAB												
		D		6	Y12	-	2680	35	2560				
		E		9	Y12	-	1420	35	1300				
		F		2	Y16	-	2500	86	730	0	0		
		G		2	Y16	-	2850	86	840	0	0		
		H		16	Y10	-	750	20	750				
		J		21	Y10	-	400	20	400				
	REF 395 MESH = 3,35mÊ2												

STEEL SCHEDULE
REINFORCEMENT DETAILS



PLAN OF COVER SLAB



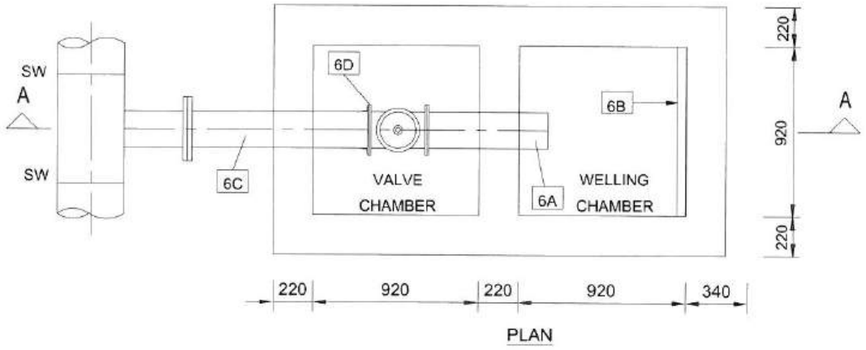
DETAIL 1
SCALE 1:10

NOTES:

1. ALL BRICKWORK TO BE PLASTERED EXTERNALLY AND INTERNALLY TO ENSURE WATERTIGHT CHAMBER. USE ENGINEERING BRICKS. BRICK FORCE TO EVERY COURSE.
2. CONCRETE TO BE GRADE 25/19. COVER = 30mm.
3. ALL FITTINGS TO BE PAINTED WITH KSIR88 EPOXY PAINT,SUCH AS COPON KSIR88 OR SIMILAR APPROVED. AFTER INSTALLATION 5mm BFGW REPAIR WRAP COATING.
4. ALL FLANGES TO TABLE 1600 OF SANS 1123.
5. FOR CHAMBERS OF DEPTHS MORE THAN 2.5m, ENGINEER TO DESIGN FLOOR SLAB AND WALLS.
6. CHAMBERS TO FLASH WITH SURFACED AREAS IN ROADS E.T.C
7. OTHER : ISOLATION AND SCOUR VALVE SPECIFICATION REFER TO ANNEXURE E:

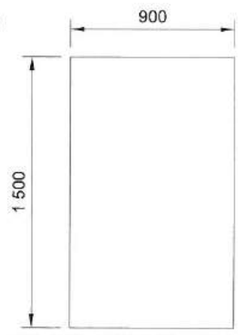
SCHEDULE OF FITTINGS

- 6A - 600 LENGTH x 168 x 4.5 MEDIUM CLASS MS PIPE TO SANS 62.
- 6B - 900 x 900 x 5 MS PLATE BOLTED TO THE WALL USING 4 No. x M10 RAWL BOLTS ONE IN EACH CORNER 100 x 100 OFF EACH FACE.
- 6C - 2000 LENGTH x 168 x 4.5 MEDIUM CLASS MS PIPE TO SANS 62.
- 6D - 168 ND SLIP ON BOSS FLANGE TO TABLE 1600/5 OF SANS 1123.
- 6G - 150 ND WATER WORKS PATTERN RESILIENT SEAL GATE VALVE, CLASS 16 TO SANS 664 WITH FLANGED ENDS TO TABLE 1600/3 OF SANS 1123, WITH CAP, NON-RISING SPINDLE, ANTI-CLOCKWISE CLOSING.
- 6F - DUCTILE IRON COVER - HEAVY DUTY ON ROADS AND POLYMER CONCRETE OR THEMOPLASTIC IN OTHER AREAS (FRAME SET IN REINFORCED CONCRETE ROOF IN BOTH CASES)



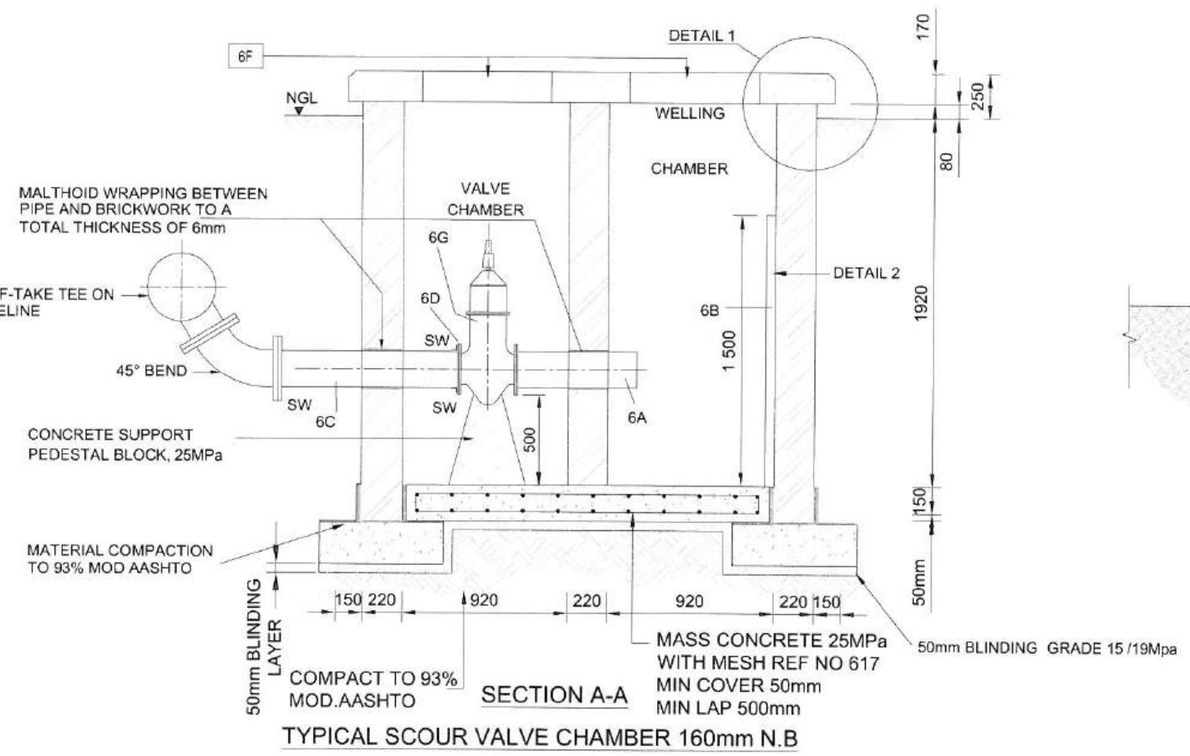
PLAN

SW - SITE WELD

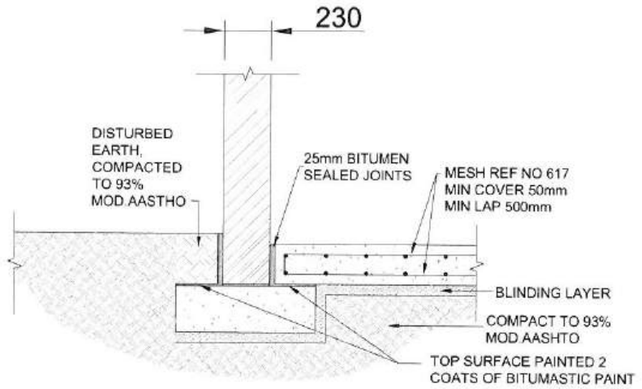


- 900 x 900 x 5 MS PLATE BOLTED TO THE WALL USING 4 No. x M10 RAWL BOLTS ONE IN EACH CORNER 100 x 100 OFF EACH FACE.

DETAIL 2



TYPICAL SCOUR VALVE CHAMBER 160mm N.B



DETAIL OF BRICK COLUMN BASE

CONSULTING ENGINEERS
CAPEX DESIGN SECTION
SWISS HOUSE
7TH FLOOR

DESIGNED: B.M.KHUMALO MAY 2017
DRAWN: B.M.KHUMALO MAY 2017
CHECKED: J.G.SUMBO DATE 18/7/17
SIGNATURE
ECSA REG. No. 20137/99
APPROVED BY: T.MPANDAGUTA DATE
SIGNATURE
ECSA REG. No. 20170150

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STANDARD DETAIL
TYPICAL SCOUR VALVE CHAMBER 160mm N.B

AMENDMENTS

SCALE	REV:	DESCRIPTION	APPROVED	DATE:

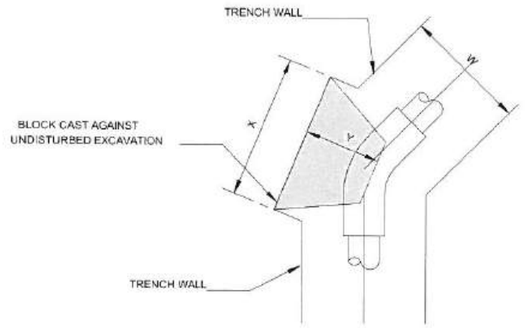
DRAWING No.JW100-DET04-W01

PROJECT No. REV.

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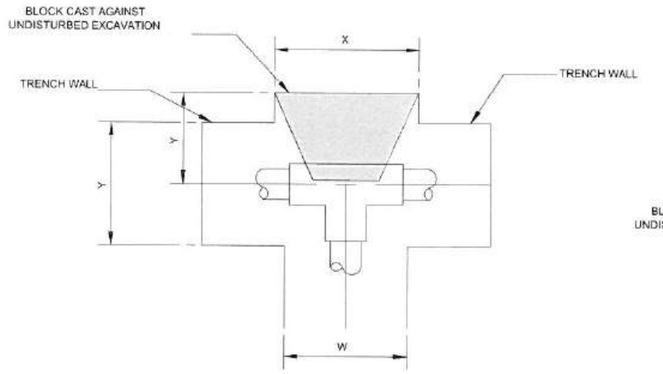
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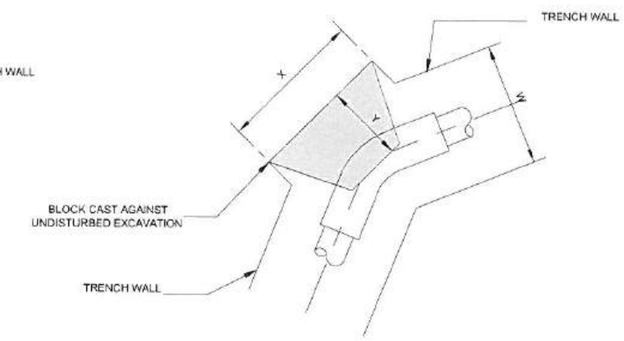
THRUST BLOCK FOR 45° BEND

NOMINAL DIAMETER ø (mm)	DIMENSIONS				
	D (mm)	Z (mm)	X (mm)	Y (mm)	VOL. (m^3)
300	1 400	700	2 000	1 000	1,400
250	1 300	650	1 600	800	0,800
200	1 200	600	1 200	600	0,430
150	1 000	500	1 000	500	0,250
100	1 000	500	350	250	0,043
75	800	400	350	200	0,028



THRUST BLOCK FOR TEE

NOMINAL DIAMETER ø (mm)	DIMENSIONS				
	D (mm)	Z (mm)	X (mm)	Y (mm)	VOL. (m^3)
300	1 400	700	2 700	1 300	2,550
250	1 300	650	2 150	1 100	1,500
200	1 200	600	1 600	800	0,770
150	1 000	500	1 300	650	0,420
100	1 000	500	500	300	0,075
75	800	400	450	300	0,054

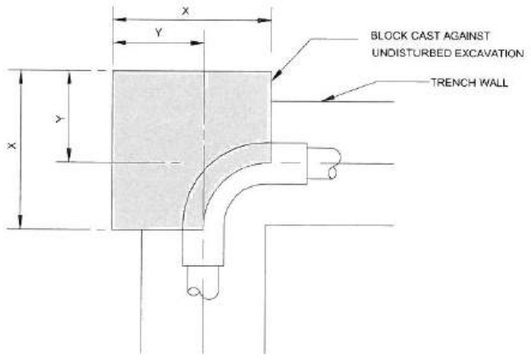


THRUST BLOCK FOR 22½° BEND

NOMINAL DIAMETER ø (mm)	DIMENSIONS				
	D (mm)	Z (mm)	X (mm)	Y (mm)	VOL. (m^3)
300	1 400	700	1 000	500	0,350
250	1 300	650	760	400	0,200
200	1 200	600	600	400	0,150
150	1 000	500	500	300	0,075
100	1 000	400	300	200	0,024
75	800	300	300	200	0,018

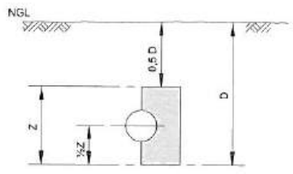
TYPICAL THRUST BLOCK DETAILS

N.T.S.



THRUST BLOCK FOR 90° BEND

NOMINAL DIAMETER ø (mm)	DIMENSIONS				
	D (mm)	Z (mm)	X (mm)	Y (mm)	VOL. (m^3)
300	1 400	700	2 700	1 400	5,00
250	1 300	650	2 150	1 100	3,00
200	1 200	600	1 600	800	1,54
150	1 000	500	1 300	700	0,80
100	1 000	500	500	300	0,12
75	800	400	450	300	0,08



SECTION

NOTES :

1. THIS TABLE WAS CALCULATED FOR THRUST BLOCKS IN SANDY SOILS.
2. USE 15 MPa CONCRETE.
3. HALF THE DEPTH OF THE THRUST BLOCK NEEDS TO BE BELOW THE PIPE AXIS.
4. KEEP THE CONCRETE AWAY FROM THE COUPLINGS & THE PIPE JOINTS.
5. THRUST BLOCKS FOR PIPE ø LARGER THAN 300mm & HIGHER TEST PRESSURES THAN 16 BAR NEEDS TO BE DESIGNED BY THE ENGINEER.
6. THRUST BLOCKS AT PADDLE FLANGES NEEDS TO BE REINFORCED & DESIGNED BY THE ENGINEER.
7. IN CASES OF SOFT CLAY & SILTY SANDS, THE ANCOR BLOKS NEED TO BE DESIGNED BY THE ENGINEER.

CONSULTING ENGINEERS
CAPEX DESIGN SECTION
SWISS HOUSE
7TH FLOOR

DESIGNED	B.MKHUMALO	MAY 2017	
DRAWN	B.MKHUMALO	MAY 2017	
CHECKED	J.GUMBO	DATE	18/7/17
	SIGNATURE		
	ECSA REG. No.	20137004	
APPROVED BY	T.MPANGOGUTA	DATE	
	SIGNATURE		
	ECSA REG. No.	20170150	

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STANDARD DETAIL
TYPICAL THRUST BLOCK DETAILS

AMENDMENTS

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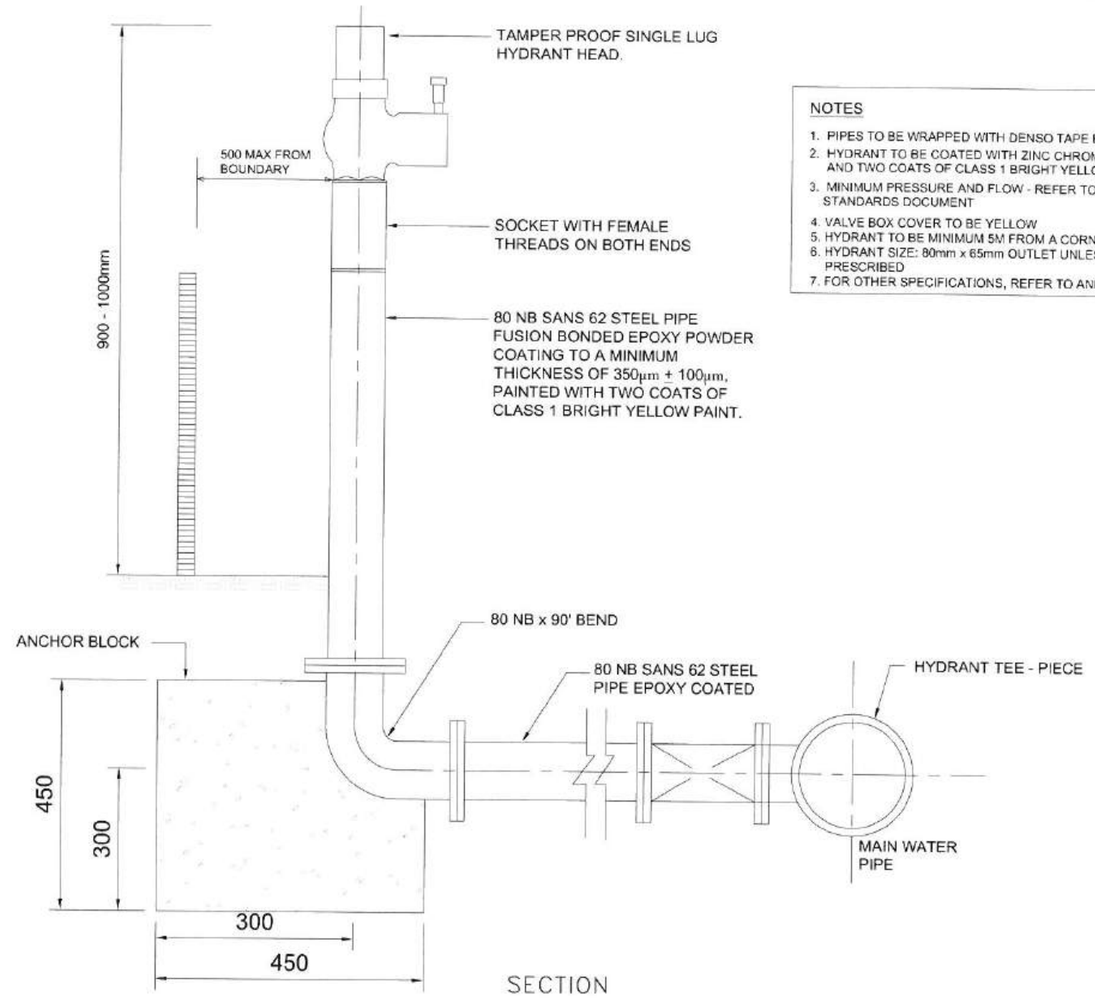
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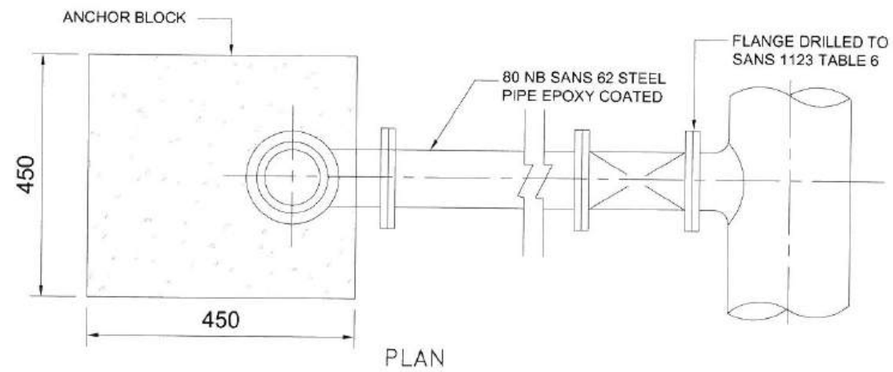
A3 SHEET 5 OF

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FILE No.



SECTION



PLAN

NOTES

1. PIPES TO BE WRAPPED WITH DENSO TAPE BELOW GROUND
2. HYDRANT TO BE COATED WITH ZINC CHROMATE UNDERCOAT AND TWO COATS OF CLASS 1 BRIGHT YELLOW PAINT.
3. MINIMUM PRESSURE AND FLOW - REFER TO TABLE 7 OF THE JW STANDARDS DOCUMENT
4. VALVE BOX COVER TO BE YELLOW
5. HYDRANT TO BE MINIMUM 5M FROM A CORNER SPLAY
6. HYDRANT SIZE: 80mm x 65mm OUTLET UNLESS OTHERWISE PRESCRIBED
7. FOR OTHER SPECIFICATIONS, REFER TO ANNEXURE E

ABOVE GROUND HYDRANT

CONSULTING ENGINEERS CAPEX DESIGN SECTION SWISS HOUSE 7TH FLOOR	DESIGNED: B.M.KHUMALO — MAY 2017 DRAWN: B.M.KHUMALO — MAY 2017 CHECKED: J.GUMBO — DATE SIGNATURE ECSA REG. No. 20137ec1t4 APPROVED BY: T.MPANDAGUTA — DATE SIGNATURE ECSA REG. No. 20170150	Johannesburg Water	17 HARRISON STREET MARSHALLTOWN 2107 TEL: (011) 688-1400 FAX: (011) 688-1529

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STANDARD DETAIL
FIRE HYDRANT DETAIL

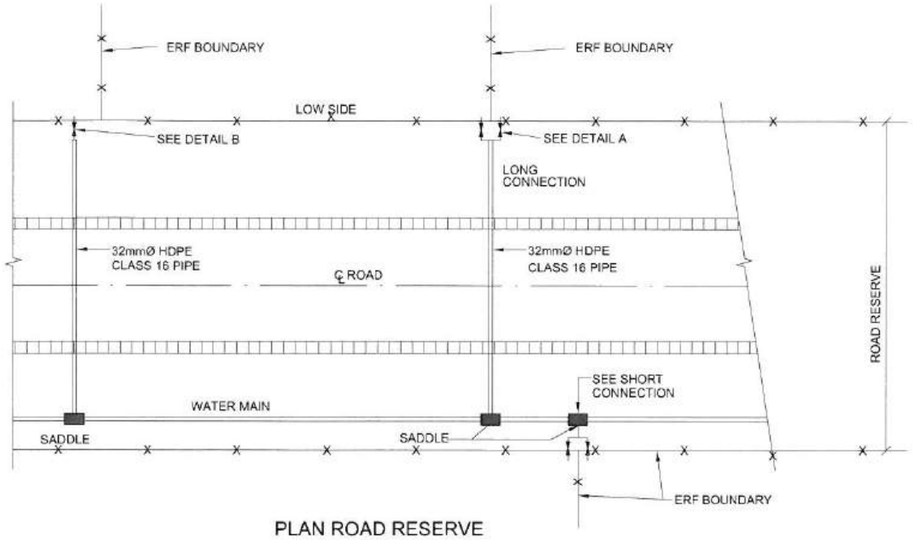
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DRAWING No.JW100-DET06-W01

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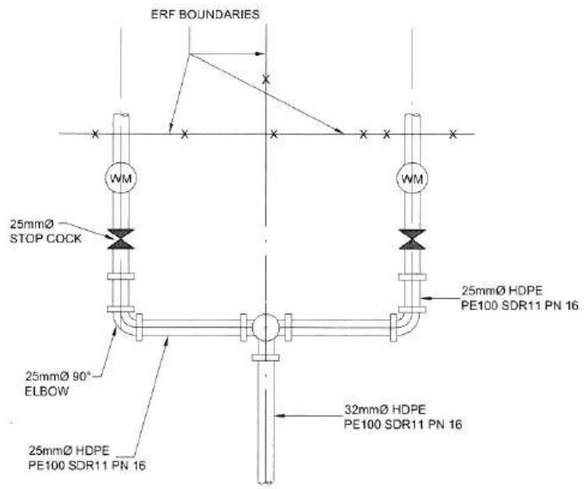
F.S.L No.



PLAN ROAD RESERVE

N.T.S.

SEE NOTE 4 FOR INDUSTRIAL CONNECTIONS

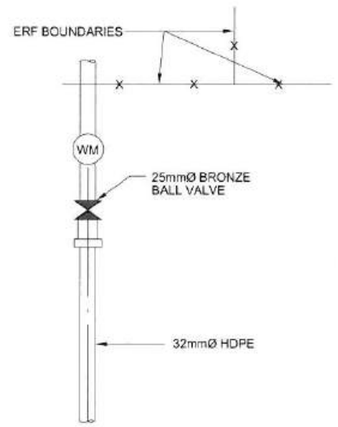


DETAIL A

(LONG DOUBLE ERF CONNECTION)

N.T.S.

SEE NOTE 4 FOR INDUSTRIAL CONNECTIONS

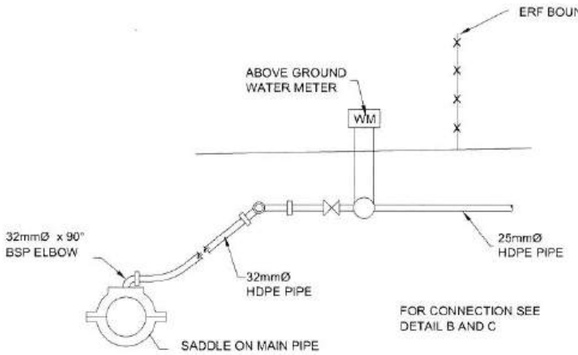


DETAIL B

(LONG AND SHORT SINGLE ERF CONNECTION)

N.T.S.

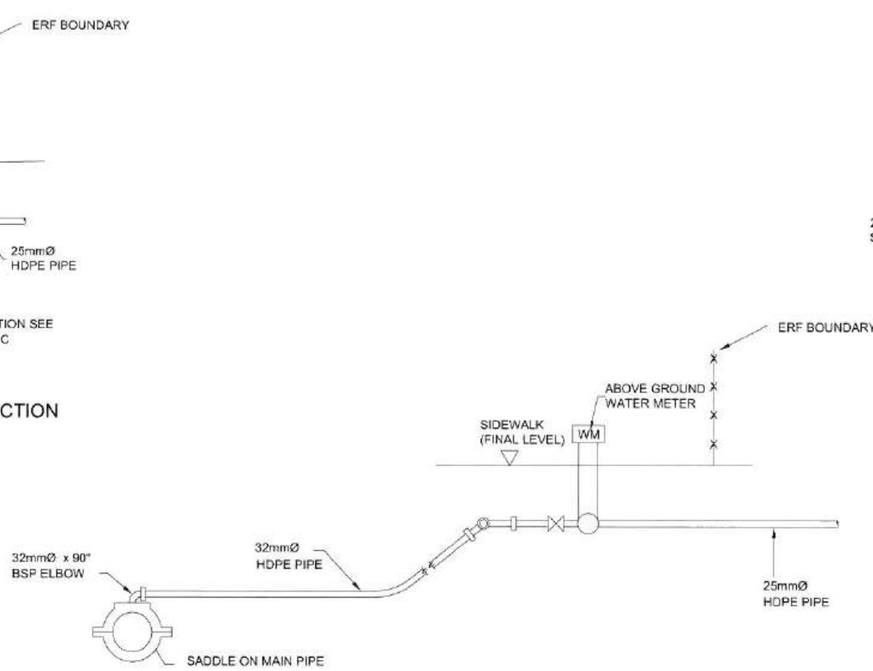
SEE NOTE 4 FOR INDUSTRIAL CONNECTIONS



SECTION OF SHORT DOUBLE ERF CONNECTION

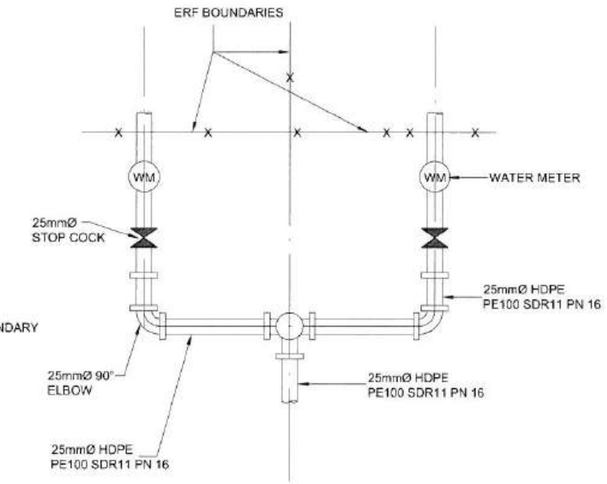
N.T.S

SEE NOTE 4 FOR INDUSTRIAL CONNECTIONS



SECTION OF LONG DOUBLE ERF CONNECTION

N.T.S.



DETAIL C

(SHORT DOUBLE ERF CONNECTION)

N.T.S.

SEE NOTE 4 FOR INDUSTRIAL CONNECTIONS

CONSULTING ENGINEERS
CAPEX DESIGN SECTION
SWISS HOUSE
7TH FLOOR

DESIGNED	B.M.KHUMALO	MAY 2017	
DRAWN	B.M.KHUMALO	MAY 2017	
CHECKED	J.GUMBO	DATE	
	SIGNATURE		
	ECSA REG. No:	20137001144	
APPROVED BY:	T.MPANGAGUTA	DATE	
	SIGNATURE		
	ECSA REG. No:	20170110	

Johannesburg Water

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STANDARD DETAIL

WATER ERF CONNECTIONS

AMENDMENTS

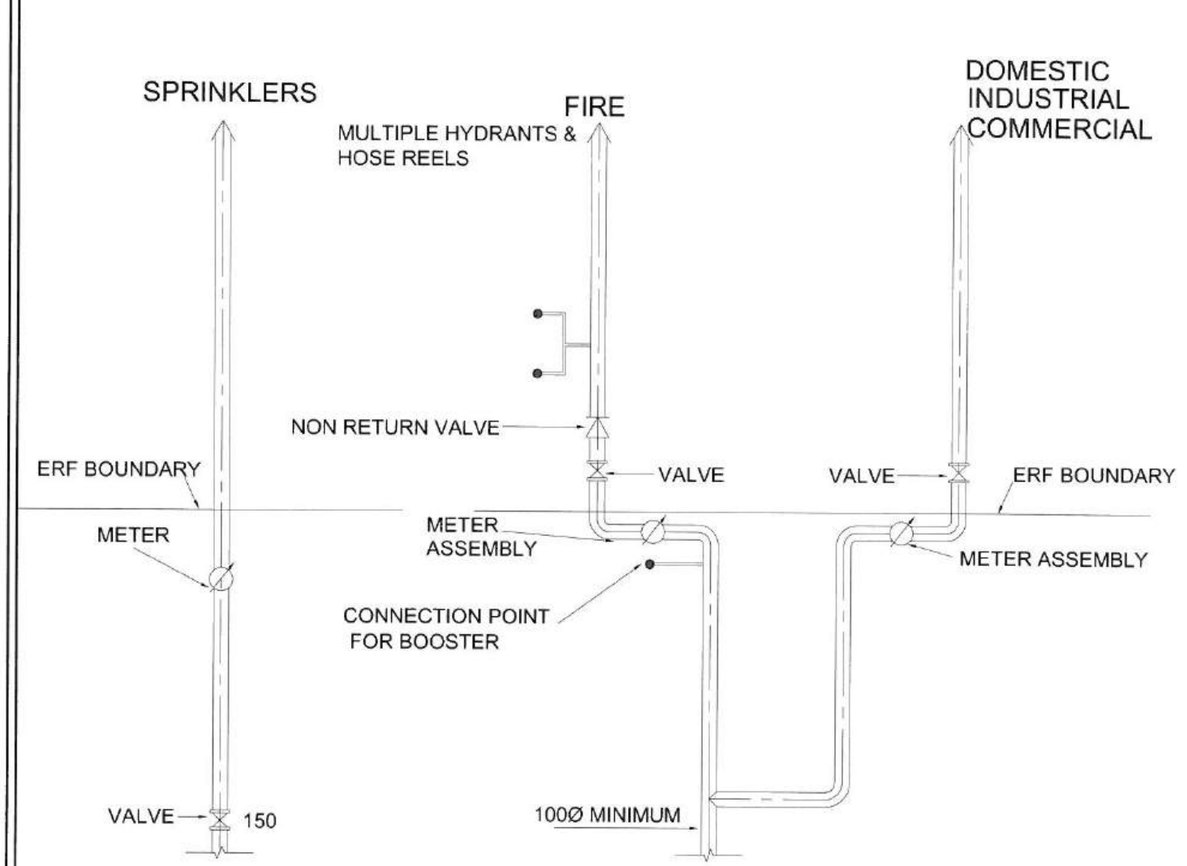
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DRAWING No.JW100-DET07-W01

PROJECT No. | REV.

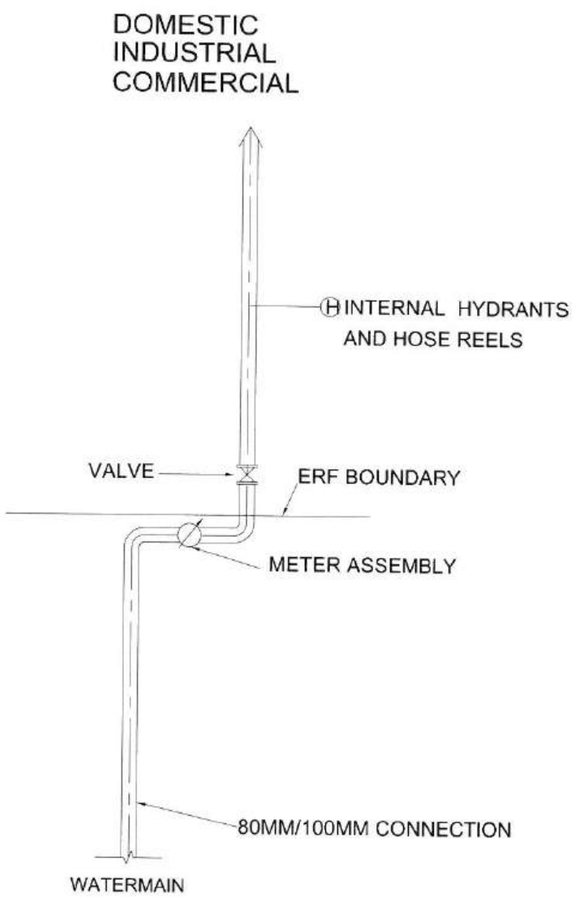
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FILE No.



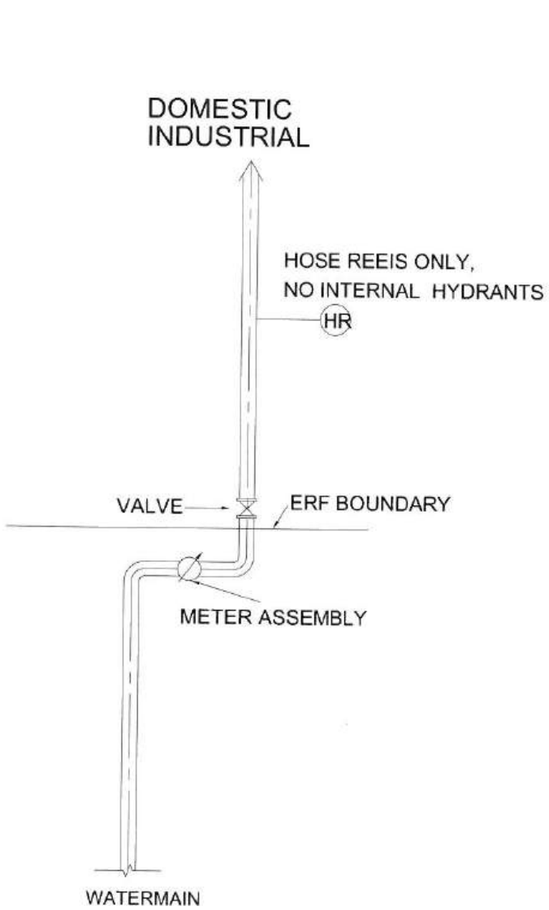
TYPE A CONNECTION

PROVISION MADE TO BOOST PRESSURE
TWO CONNECTIONS FROM STREET MAIN



TYPE B CONNECTION

PRESSURE BOOSTER POINT OPTIONAL
SINGLE SUPPLY (DOMESTIC AND FIRE)



TYPE C CONNECTION

NON-BOOSTED FIRE CONNECTION
SINGLE SUPPLY (DOMESTIC AND FIRE)

SCHEMATIC LAYOUT OF TYPICAL WATER CONNECTIONS FOR DOMESTIC, INDUSTRIAL AND COMMERCIAL PROPERTIES (BIG CONNECTION)

(HOSE REELS, INTERNAL HYDRANTS AND OR SPRINKLERS REQUIRED)

NOTES:

1. VALVES TYPE: RESILIENT OR WEDGE TYPE GATE VALVE AS APPLICABLE.
2. REFER TO METERING GUIDELINES. (LATEST VERSION)
3. METER ASSEMBLY TO INCLUDE STRAINER, METER AND ISOLATION VALVE.
4. METER ARRANGEMENT: AS PER DETAIL JW100-DET09W01 FOR SIZES 50-150mm N.B

CONSULTING ENGINEERS
CAPEX DESIGN SECTION
SWISS HOUSE
7TH FLOOR

DESIGNED: B.M.KHUMALO MAY 2017
DRAWN: B.M.KHUMALO MAY 2017
CHECKED: J.GUMBO DATE: 18/9/17
SIGNATURE:
ECSA REG. No. 20137802 44
APPROVED BY: T.MPANDAGUTA DATE:
SIGNATURE:
ECSA REG. No. 20170150

Johannesburg Water

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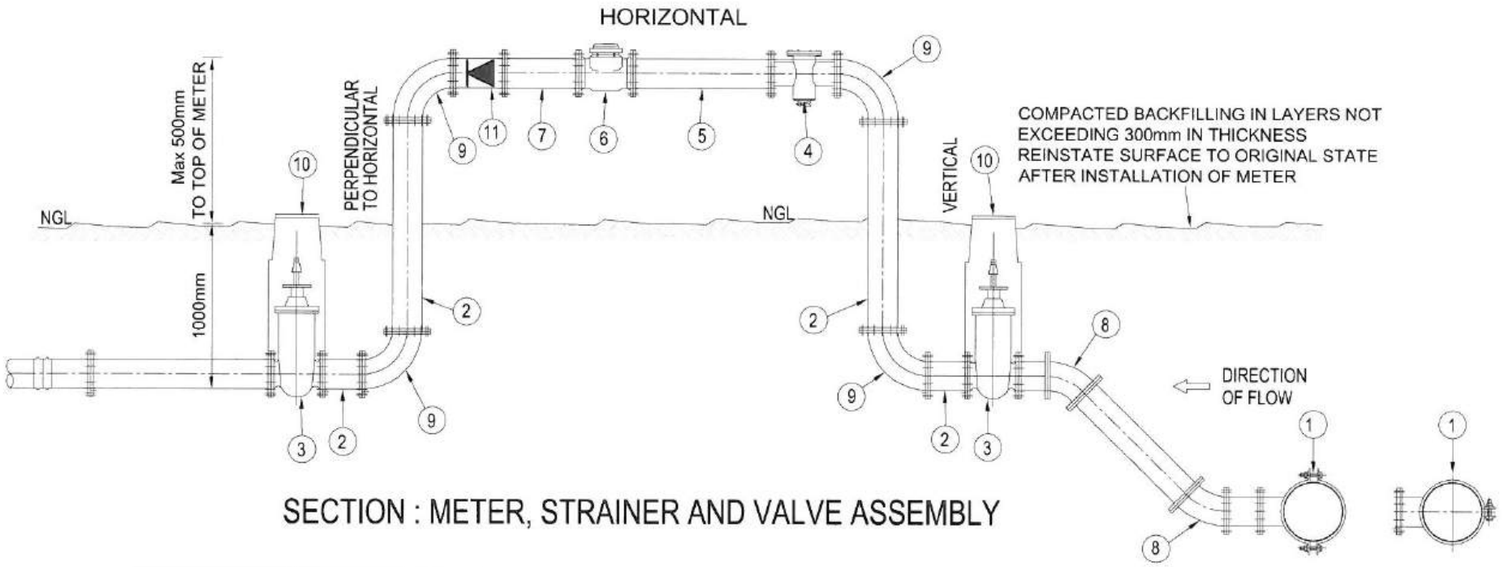
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STANDARD DETAIL
METERED FIRE CONNECTIONS

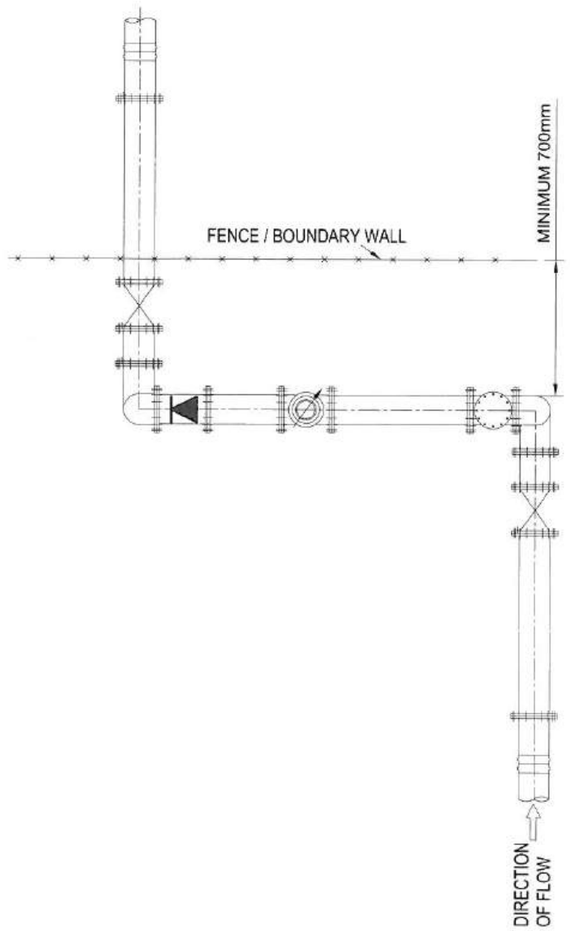
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DRAWING No.JW100-DET8-W01

PROJECT No: REV:
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SHEET 8 OF
FILE No:



SECTION : METER, STRAINER AND VALVE ASSEMBLY



TYPICAL DETAIL FOR METER INSTALLATIONS FOR JOHANNESBURG WATER		
PIPE SCHEDULE AND FITTINGS 50 -150mm + DIA. WATER METER INSTALLATION		
ITEM	**No OFF**	**DESCRIPTION**
1	1	REDUCING TEE (TO BE FLANGED OR FABRICATED TO SUIT EXISTING PIPE MATERIAL)
2	4	FLANGED STEEL PIPE TO SUIT
3	2	RSV (Ø UP TO AND INCLUDING 150mm) NON RISING SPINDLE GATE VALVE, FLANGED ON BOTH ENDS TO JHB WATER SPECIFICATION.
4	1	IN LINE STRAINER, FLANGED BOTH ENDS
5	1	5 X Dia. STEEL FLANGED DISTANCE PIECE,(50mm : 5xDia STEEL FLANGED DISTANCE PIECE MINIMUM 250mm)
6	1	WPD WATER METER FLANGED BOTH ENDS.
7	1	3 X Dia . STEEL FLANGED DISTANCE PIECE,(50mm : 3xDia STEEL FLANGED DISTANCE PIECE MINIMUM 150mm)
8	2	FLANGED 45° BEND
9	4	FLANGED 90° BEND
10	1	JOHANNESBURG WATER VALVE BOXES WITH BLUE LID, TO SUIT VALVE SIZE TYPE 5 TO SANS 1808..
11	1	NON RETURN VALVE

NOTES:
1. ALL FLANGES TO TABLE 1600/3.
2. ALL FLANGES ABOVE GROUND MUST HAVE ONE SHEARING BOLTS PER FLANGE ARRANGEMENT.
3. ALL DIMENSIONS TO BE CHECKED BEFORE MANUFACTURE/FITTING.
4. ALL PIPES AND FITTINGS TO HAVE MINIMUM WORKING PRESSURE OF 16 BAR.
5. LENGTH OF ITEM 5 TO BE AT LEAST 5 X DIA.AND ITEM 7 TO AT LEAST 3 X DIA.
6. ALL BURIED MILD STEEL FLANGES AND COUPLINGS MUST BE MUST BE CORROSION PROTECTED USING DENSO PRODUCTS. OR SIMILAR APPROVED PRODUCT USED FOR CATHODIC PROTECTION TO BE SUITABLE FOR MATERIAL PROTECTION.
7. METER ARRANGEMENT APPLICABLE TO ALL NEW INSTALLATIONS SUCH AS INDUSTRIAL/ COMMERCIAL/ TOWNHOUSE/COMPLEXES/ FIRE INSTALLATIONS AS APPLICABLE.
8. ALL STEEL PIPE PIECES FOR ABOVE GROUND INSTALLATIONS MUST BE LINED INTERNALLY AND COATED EXTERNALLY WITH NON-TAINTING FUSION BONDED POWDERED EPOXY COATING (SANS 1217 TYPE 2) WITH MINIMUM 250 MICRONS AND MAXIMUM 600 MICRONS COAT FILM THICKNESS. FOR FLANGED DISTANCE PIECES AND FLANGED BENDS A UV PROTECTOR MUST BE INCORPORATED ON THE EXTERNAL COATING. THE FINAL COLOUR FOR ALL PIPES AND FITTINGS SHALL BE CORNFLOWER BLUE.
9. FOR ALL OTHER SPECIFICATIONS NOT COVERED ABOVE , REFER TO THE JW METERING GUIDELINES.

CONSULTING ENGINEERS
CAPEX DESIGN SECTION
SWISS HOUSE
7TH FLOOR

DESIGNED: B.M.KHUMALO MAY 2017
DRAWN: B.M.KHUMALO MAY 2017
CHECKED: J.GUMBO DATE: 18/9/17
SIGNATURE:
ECSA REG. No: 20137900 44
APPROVED BY: T.MPANDAGUTA DATE:
SIGNATURE:
ECSA REG. No: 20170150

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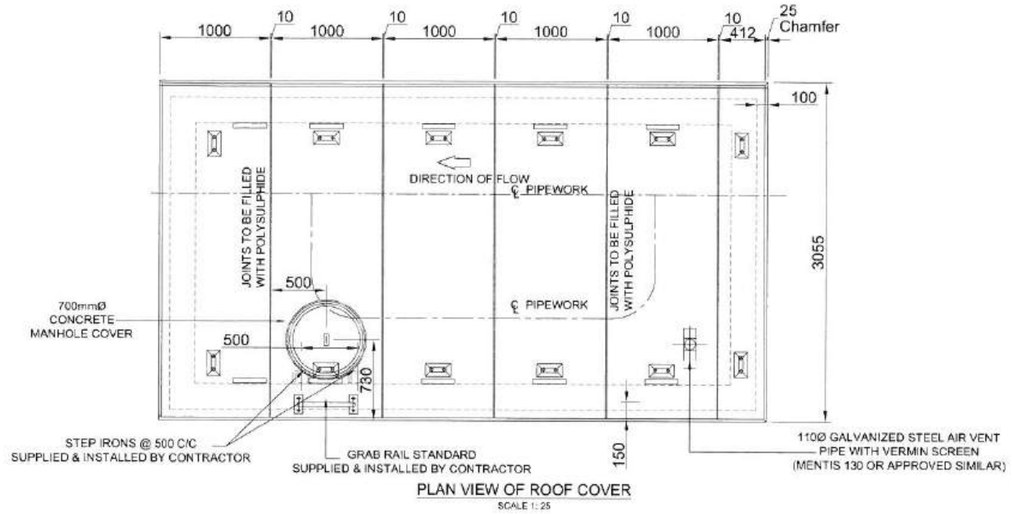
STANDARD DETAIL
ABOVE GROUND WATER METER UP TO 150mm N.B

AMENDMENTS

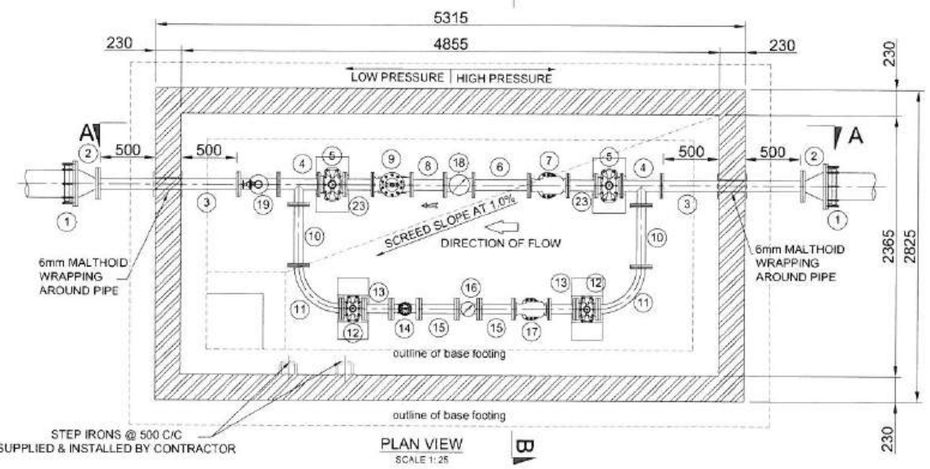
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DRAWING No.JW100-DET09-W01

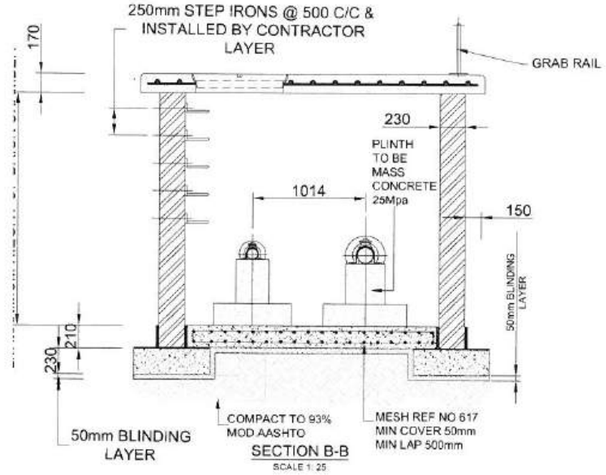
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PLAN VIEW OF ROOF COVER
SCALE 1: 25



PLAN VIEW
SCALE 1: 25



SECTION B-B
SCALE 1: 25

PRESSURE REDUCING VALVE

STEEL PIPE FITTINGS AND ITEM LIST

ITEM NR.	DESCRIPTION	DIMENSIONS	QUANTITY	FLANGE TABLE
①	250Ø FLANGE ADAPTOR FOR STEEL/uPVC CLASS 16 PIPE		2	SABS 1123 TABLE 1600
②	250x150 FLANGED REDUCER		2	
③	150Ø DOUBLE FLANGED STEEL PIPE WITH A PRESSURE TRANSMITTER (EXCLUDING PRESSURE GAUGE) AND PUDDLE FLANGE		2	
④	150 x 100 FLANGED REDUCING TEE		2	
⑤	150Ø NB ISOLATING WEDGE TYPE GATE VALVE		2	
⑥	150Ø DOUBLE FLANGED DISTANCE PIECE WITH CLAMP PRESSURE TRANSMITTER		1	
⑦	150Ø FLANGED STRAINER		1	
⑧	150Ø DOUBLE FLANGED DISTANCE PIECE WITH CLAMP		1	
⑨	150Ø PRESSURE REDUCING VALVE		1	
⑩	100Ø DOUBLE FLANGED DISTANCE PIECE		2	
⑪	100Ø x 90° FLANGED STEEL BEND		2	
⑫	100Ø NB ISOLATING WEDGE TYPE GATE VALVE		2	
⑬	100Ø DOUBLE FLANGED DISTANCE PIECE		2	
⑭	100Ø PRESSURE REDUCING VALVE		1	
⑮	100Ø DOUBLE FLANGED DISTANCE PIECE		2	
⑯	100Ø MEINECKE TURBINE COSMOS WPD WATER METER (OR SIMILAR APPROVED), PN16. BOTH ENDS FLANGED TO SABS 1123 - 1600/3		1	
⑰	100Ø FLANGED STRAINER		1	
⑱	100Ø MEINECKE TURBINE COSMOS WPD WATER METER (OR SIMILAR APPROVED), PN16. BOTH ENDS FLANGED TO SABS 1123 - 1600/3		2	
⑲	150NB x 80NB FLANGED UNEQUAL TEE (AIR ACCUMULATOR). FLANGES DRILLED TO SANS 1123-1600/3		1	
⑳	FLANGED RISER PIECE. ONE END FLANGED TO SUIT AIR VALVE, OTHER END FLANGED TO SUIT 80NB, FLANGES DRILLED TO SANS 1123-1600/3		1	
㉑	80NB FLANGED, PN16, RSV. (TO JOHANNESBURG WATER SPECIFICATIONS)		1	
㉒	50mm VENT-O-MAT AIR VALVE TYPE 950 RSX 16/1		1	
㉓	150Ø DOUBLE FLANGED DISTANCE PIECE		2	

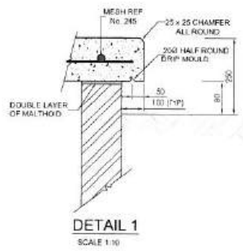
GENERAL NOTES:

1. ALL BRICKWORK TO BE PLASTERED EXTERNALLY AND INTERNALLY TO ENSURE WATERTIGHT CHAMBER. USE ENGINEERING BRICKS.
2. CONCRETE FOR THE BASE AND ROOF SLAB TO BE GRADE 25/19. COVER TO REINFORCEMENT - 30mm.
3. ALL FITTINGS TO BE PAINTED WITH COPON KSR88 EPOXY PAINT. AFTER INSTALLATION 5mm EPOXY REPAIR WRAP COATING.
4. ALL FLANGES TO TABLE 1600 OF SANS 1123.
5. PIPES TO BE WRAPPED WITH 6mm THICK MALTHOID WRAPPING THROUGH WALLS.
6. CHAMBER DIMENSION AND DEPTH ARE SUBJECT TO CHANGE UPON CONFIRMATION OF THE EXISTING PIPE LOCATION AND DEPTH.
7. FITTINGS ARE SUBJECT TO CHANGE UPON CONFIRMATION OF THE EXISTING PIPE MATERIALS.
8. EVERY CHAMBER MUST HAVE A 100mm DIAMETER VENT PIPE WITH MOSQUITO GAUZE.
9. PEDESTALS TO BE PROVIDED AS DIRECTED BY THE ENGINEER AT SITE.
10. VALVE KEY HOLES TO BE PROVIDED IN THE ROOF ABOVE EVERY VALVE OR AS DIRECTED.
11. DEPTH OF CHAMBERS 2m MAXIMUM HEIGHT OF BRICK CHAMBER.
12. ENGINEERING BRICKS WITH BRICK-FORCE EVERY 3rd COURSE FOR ALL CHAMBERS.
13. ROOF SLAB TO BE MADE OF PRECAST PANELS.
14. 230mm BRICK WALL OF 1m HIGH FROM BASE SLAB.

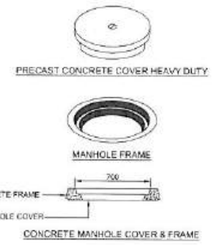
PRESSURE REDUCING VALVE(CLAYTON + ANTI CAVITATION RING)

ALL PRV SHALL COMPLY WITH FOLLOWING SPECIFICATIONS:

a. 690S-01ABECS1-x101 PRESSURE REDUCING VALVES.
b. DUCTILE IRON BODY AND COVER WITH STAINLESS STEEL TRIM.
c. FUSION BONDED EPOXY COATED INTERNALLY AND EXTERNALLY TO A MINIMUM OF 250 MICRONS PN 25 RATED.
d. COMPLETE WITH FULLY ADJUSTABLE CRD PRESSURE REDUCING PILOT VALVE (ADJUSTABLE DOWNSTREAM BETWEEN 2:1 BARS AND 21 BARS).
e. WITH PRESSURE GAUGE, OPENING AND CLOSING SPEED CONTROLS AND x101 VISION POSITION INDICATOR.
f. MUST BE FLANGED AND DRILLED TO SANS 1123 TABLE 1600, INCLUDING CUTTING OF PIPES COUPLING etc.
g. MUST BE COMPLETE WITH H-TYPE STRAINER-DUCTILE IRON BODY AND COVER-STAINLESS STEEL REMOVABLE IN A DUCTILE IRON FUSION BONDED EPOXY COATED FRAME 2mm MESH-FUSION BONDED EPOXY INTERNALLY AND EXTERNALLY TO A MINIMUM OF 250mm MICRON - PN 25 RATED FLANGED AND DRILLED TO SANS 1123 TABLE 1600 FACE TO FACE = 900mm
h. WALLS TO BE REINFORCEMENT CONCRETE



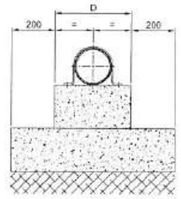
DETAIL 1
SCALE 1:10

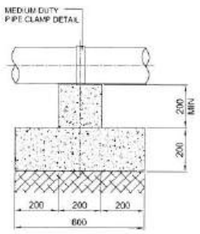


CONCRETE MANHOLE COVER & FRAME

NOTES:

1. PLINTHS TO BE FOUNDED ON COMPACTED MATERIAL (MIN 90% Mod AASHTO)

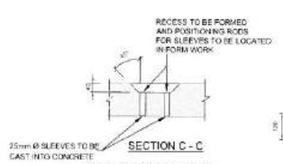




TYPICAL PLINTH DETAIL
SCALE 1:10

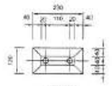
PIPE POSITIONING ON PLINTHS

PIPE SIZE (NB)	PIPE CRS 'A'	PLINTH SIZE 'B'	'C'	'D'
50	165	600	400	200
65	185	650	450	200
80	195	650	450	300
100	220	750	500	300
150	275	900	600	350
200	330	1050	700	400

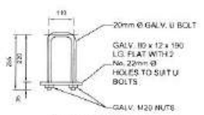


SECTION C - C

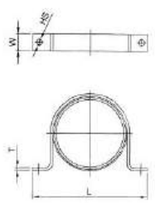
DETAILS OF LIFTING EYE
SCALE 1:10
8 No. OFF
(SUPPLIED BY CONTRACTOR)



PLAN



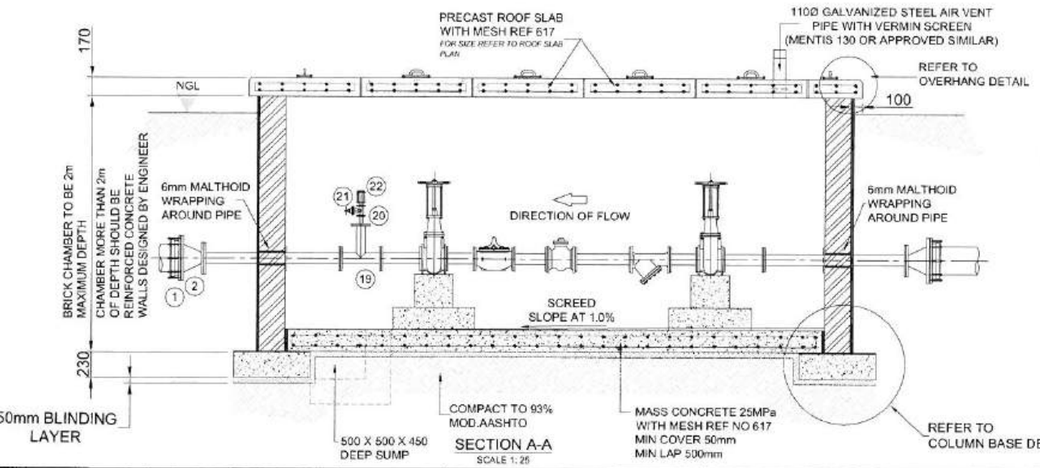
BOLT DETAIL
(SUPPLIED BY CONTRACTOR)



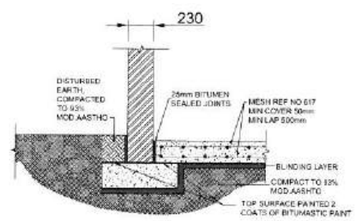
MEDIUM DUTY PIPE CLAMP DETAIL
SCALE 1:5

MEDIUM DUTY PIPE CLAMP SIZES

PIPE SIZE (NB)	L (mm)	W x T (mm)	HS (mm)
50	160	40 x 6	14
65	175	40 x 6	14
80	190	40 x 6	14
100	215	40 x 6	14
150	265	40 x 6	14
200	315	40 x 6	14



SECTION A-A
SCALE 1: 25



DETAIL OF BRICK COLUMN BASE
SCALE 1:20

CONSULTING ENGINEERS: CAPEX DESIGN SECTION SWISS HOUSE 7TH FLOOR	DESIGNED	B.MJOHUMALO	MAY 2017		
	DRAWN	B.MJOHUMALO	MAY 2017		
	CHECKED	J.GUMBO	DATE:	19/7/17	
		SIGNATURE:			
		ECSA REG. No.:	2013/08/44		
	APPROVED BY:	T.MPANDAGUTA	DATE:		
		SIGNATURE:			
		ECSA REG. No.:	20170150		

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STANDARD DETAIL

TYPICAL 100Ø PRESSURE REDUCING VALVE CHAMBER

AMENDMENTS

SCALE	REV.	DESCRIPTION	APPROVED	DATE

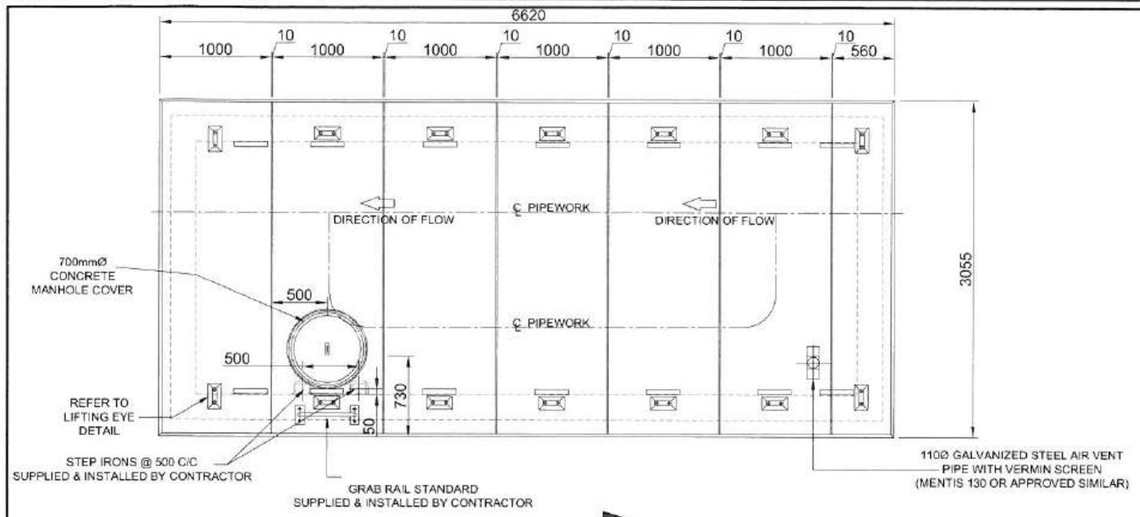
DRAWING No.JW100-DET10.1-W01

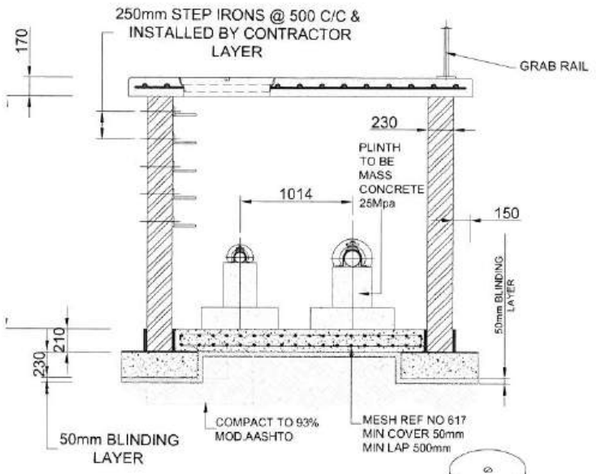
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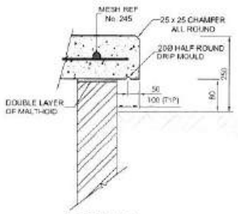
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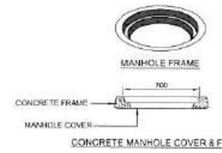
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DETAIL 1
SCALE 1:10



CONCRETE MANHOLE COVER & FRAME

NOTES:

1. PLINTHS TO BE FOUNDED ON COMPACTED MATERIAL (MIN 90% Mod AASHTO)

PRESSURE REDUCING VALVE

STEEL PIPE FITTINGS AND ITEM LIST

ITEM NR.	DESCRIPTION	DIMENSIONS	QUANTITY	FLANGE TABLE
①	250Ø FLANGE ADAPTOR FOR STEEL/uPVC CLASS 16 PIPE		2	SABS 1123 TABLE 1600
②	250x150 FLANGED REDUCER	230	2	
③	150Ø DOUBLE FLANGED STEEL PIPE WITH A PRESSURE TRANSMITTER (EXCLUDING PRESSURE GAUGE) AND PUDDLE FLANGE	1805	2	
④	150 x 100 FLANGED REDUCING TEE	1226, 330, 330	2	
⑤	150Ø NB ISOLATING WEDGE TYPE GATE VALVE	280	2	
⑥	150Ø DOUBLE FLANGED DISTANCE PIECE WITH CLAMP PRESSURE TRANSMITTER	765	1	
⑦	150Ø FLANGED STRAINER	405	1	
⑧	150Ø DOUBLE FLANGED DISTANCE PIECE WITH CLAMP	400	1	
⑨	150Ø PRESSURE REDUCING VALVE	680	1	
⑩	100Ø DOUBLE FLANGED DISTANCE PIECE	300	2	
⑪	100Ø x 90° FLANGED STEEL BEND	300	2	
⑫	100Ø NB ISOLATING WEDGE TYPE GATE VALVE	254	2	
⑬	100Ø DOUBLE FLANGED DISTANCE PIECE	805	2	
⑭	100Ø PRESSURE REDUCING VALVE	350	1	
⑮	100Ø DOUBLE FLANGED DISTANCE PIECE	407	2	
⑯	100Ø MEINECKE TURBINE COSMOS WPD WATER METER (OR SIMILAR APPROVED), PN16, BOTH ENDS FLANGED TO SABS 1123 - 1600/3.	230	1	
⑰	100Ø FLANGED STRAINER	230	1	
⑱	100Ø MEINECKE TURBINE COSMOS WPD WATER METER (OR SIMILAR APPROVED), PN16, BOTH ENDS FLANGED TO SABS 1123 - 1600/3.	300	2	
⑲	150ØB x 80NB FLANGED UNEQUAL TEE (AIR ACCUMULATOR), FLANGES DRILLED TO SANS 1123-1600/3		1	
⑳	FLANGED RISER PIECE, ONE END FLANGED TO SUIT AIR VALVE, OTHER END FLANGED TO SUIT 80NB, FLANGES DRILLED TO SANS 1123-1600/3		1	
㉑	80NB FLANGED, PN16, RSV, (TO JOHANNESBURG WATER SPECIFICATIONS)		1	
㉒	25mm VENT-O-MAT AIR VALVE : TYPE 060 REV. 1601		1	
㉓	150Ø DOUBLE FLANGED DISTANCE PIECE	350	2	

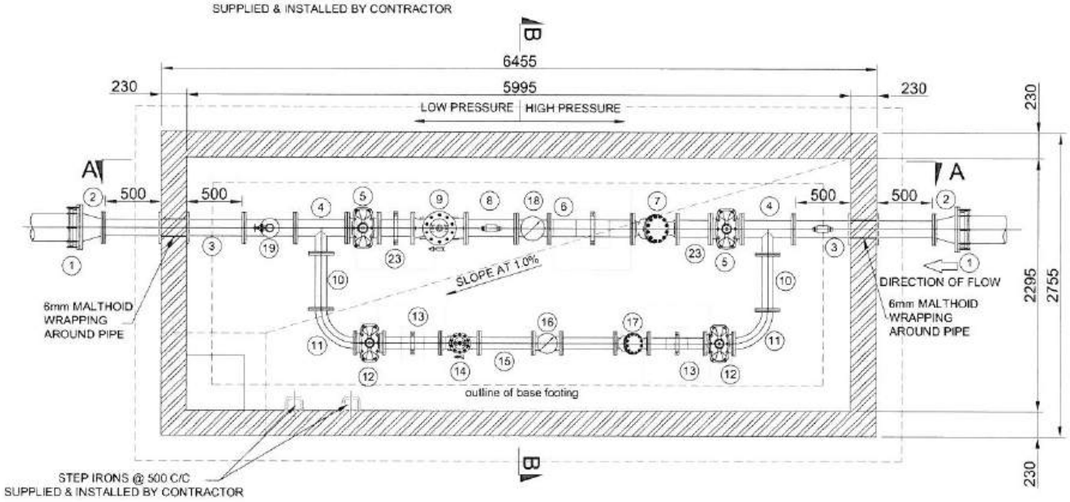
GENERAL NOTES:

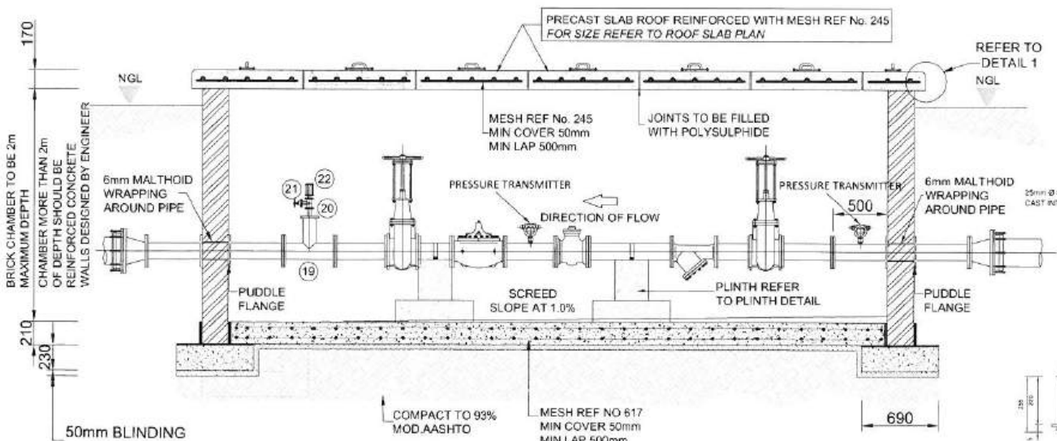
1. ALL BRICKWORK TO BE PLASTERED EXTERNALLY AND INTERNALLY TO ENSURE WATERTIGHT CHAMBER. USE ENGINEERING BRICKS.
2. CONCRETE FOR THE BASE AND ROOF SLAB TO BE GRADE 25/19. COVER TO REINFORCEMENT = 30mm.
3. ALL FITTINGS TO BE PAINTED WITH COPON KSR68 EPOXY PAINT. AFTER INSTALLATION 5mm EPOXY REPAIR WRAP COATING.
4. ALL FLANGES TO TABLE 1600 OF SANS 1123.
5. PIPES TO BE WRAPPED WITH 6mm THICK MALTHOID WRAPPING THROUGH WALLS.
6. CHAMBER DIMENSION AND DEPTH ARE SUBJECT TO CHANGE UPON CONFIRMATION OF THE EXISTING PIPE LOCATION AND DEPTH.
7. FITTINGS ARE SUBJECT TO CHANGE UPON CONFIRMATION OF THE EXISTING PIPE MATERIALS.
8. EVERY CHAMBER MUST HAVE A 100mm DIAMETER VENT PIPE WITH MOSQUITO GAUZE.
9. PEDESTALS TO BE PROVIDED AS DIRECTED BY THE ENGINEER AT SITE.
10. VALVE KEY HOLES TO BE PROVIDED IN THE ROOF ABOVE EVERY VALVE OR AS DIRECTED.
11. DEPTH OF CHAMBERS 2m MAXIMUM HEIGHT OF BRICK CHAMBER.
12. ENGINEERING BRICKS WITH BRICK-FORCE EVERY 3rd COURSE FOR ALL CHAMBERS.
13. ROOF SLAB TO BE MADE OF PRECAST PANELS.
14. 230mm BRICKWALL OF 1m HEIGHT FROM BASE SLAB.

PRESSURE REDUCING VALVE(CLAYTON + ANTI CAVITATION RING)

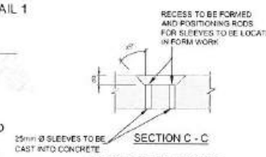
ALL PRV SHALL COMPLY WITH FOLLOWING SPECIFICATIONS.

a. 500G-01ABEGSI x101 PRESSURE REDUCING VALVES.
b. DUCTILE IRON BODY AND COVER WITH STAINLESS STEEL TRIM.
c. FUSION BONDED EPOXY COATED INTERNALLY AND EXTERNALLY TO A MINIMUM OF 250 MICRONS PN 25 RATED.
d. COMPLETE WITH FULLY ADJUSTABLE CRD PRESSURE REDUCING PILOT VALVE (ADJUSTABLE DOWNSTREAM BETWEEN 2.1 BARS AND 21 BARS).
e. WITH PRESSURE GAUGE, OPENING AND CLOSING SPEED CONTROLS AND x101 VISUAL POSITION INDICATOR.
f. MUST BE FLANGED AND DRILLED TO SANS 1123 TABLE 1600, INCLUDING CUTTING OF PIPES,COUPLINGS etc.
g. MUST BE COMPLETE WITH Y-TYPE STRAINER-DUCTILE IRON BODY AND CONTAINALESS STEEL REMOVABLE IN A DUCTILE IRON FUSION BONDED EPOXY COATED FRAME 2mm MESH.FUSION BONDED EPOXY INTERNALLY AND EXTERNALLY TO A MINIMUM OF 250mm MICRON - PN 25 RATED FLANGED AND DRILLED TO SANS 1123 TABLE 1600 FACE TO FACE = 500mm
h. WALLS TO BE REINFORCEMENT CONCRETE.

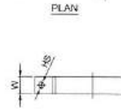


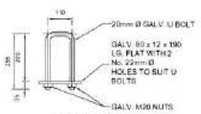


SECTION A-A
SCALE 1: 25

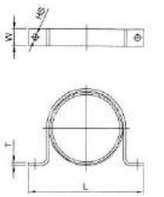


DETAILS OF LIFTING EYE
SCALE 1:10
8 No. OFF
(SUPPLIED BY CONTRACTOR)





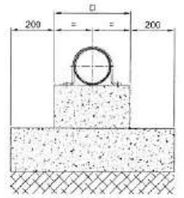
BOLT DETAIL
(SUPPLIED BY CONTRACTOR)

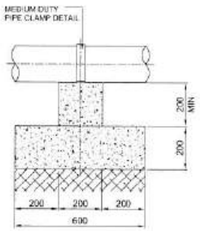


MEDIUM DUTY
PIPE CLAMP DETAIL
SCALE 1:5

MEDIUM DUTY PIPE CLAMP SIZES

PIPE SIZE (NB)	L (mm)	W x T (mm)	HS (mm)
50	160	40 x 6	14
65	175	40 x 6	14
80	190	40 x 6	14
100	215	40 x 6	14
150	265	40 x 6	14
200	315	40 x 6	14

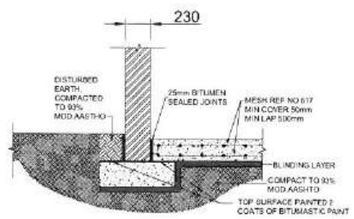




TYPICAL PLINTH DETAIL
SCALE 1:10

PIPE POSITIONING ON PLINTHS

PIPE SIZE (NB)	PIPE CRS 'A'	PLINTH SIZE 'B'	'C'	'D'
50	165	600	400	200
65	185	650	450	200
80	195	650	450	300
100	220	750	500	300
150	275	900	600	350
200	330	1060	700	400



DETAIL OF BRICK COLUMN BASE
SCALE 1:20

CONSULTING ENGINEERS CAPEX DESIGN SECTION SWISS HOUSE 7TH FLOOR	DESIGNED	B.MJOKUMALO	MAY 2017	
	DRAWN	B.MJOKUMALO	MAY 2017	
	CHECKED	J.GUMBO	DATE: 10/7/17	
		SIGNATURE:		
		EGSA REG. No: 20137ee44		
	APPROVED BY:	T.MPANGAGUTA	DATE:	
		SIGNATURE:		
		EGSA REG. No: 20170150		

Johannesburg Water

17 HARRISON STREET
MARSHALLTOWN
2107

TEL: (011) 688-1400

FAX: (011) 688-1529

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STANDARD DETAIL

TYPICAL 150Ø PRESSURE REDUCING VALVE CHAMBER

AMENDMENTS

SCALE	REV.	DESCRIPTION	APPROVED	DATE

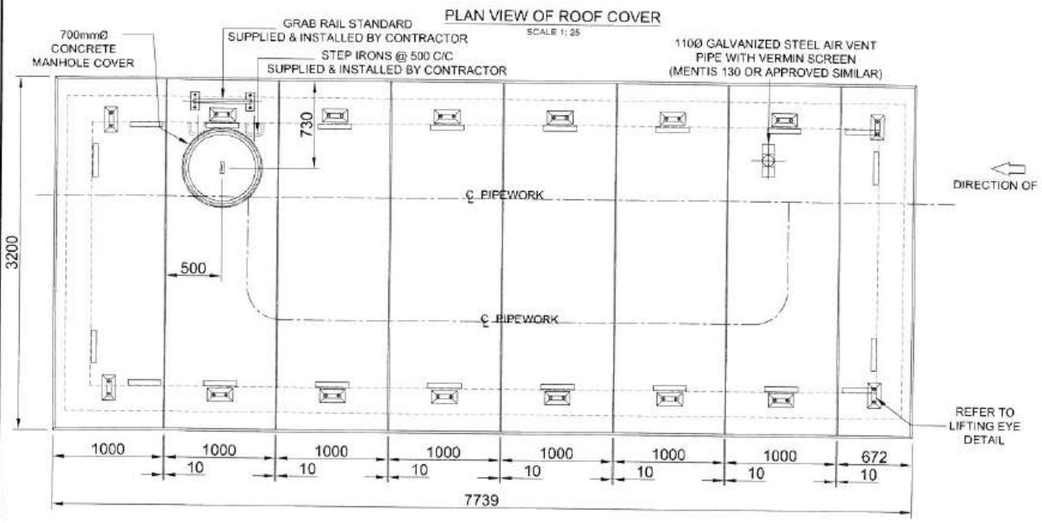
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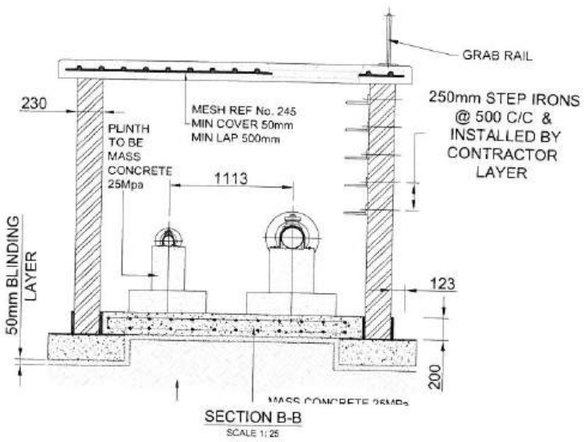
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A3 ORIGINAL PAGE SIZE | SHEET 10.2 OF

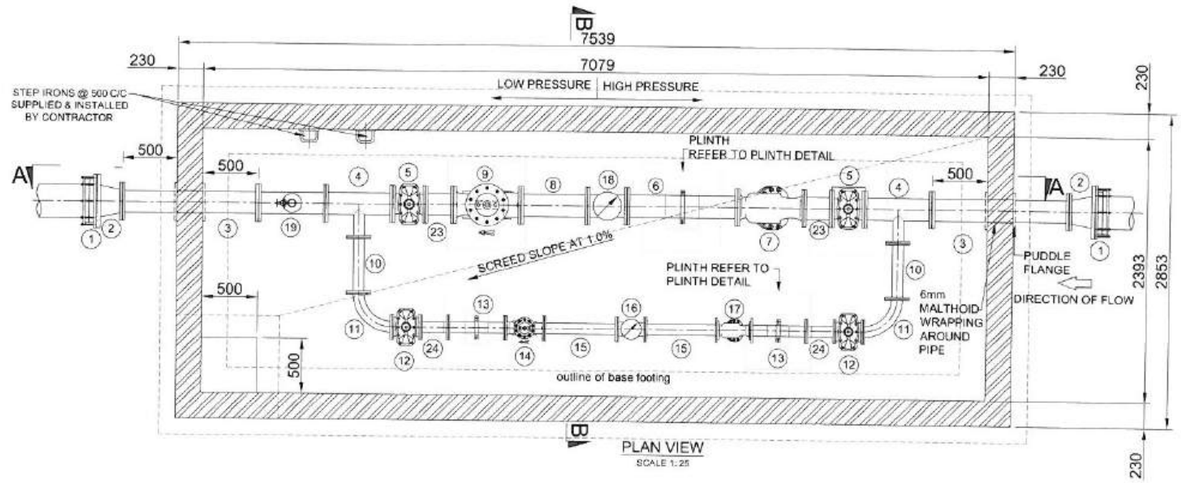
FILE No.

PLAN VIEW OF ROOF COVER
SCALE 1: 25

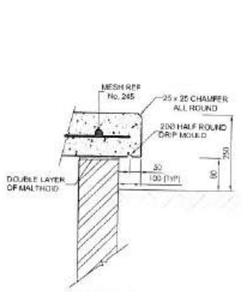




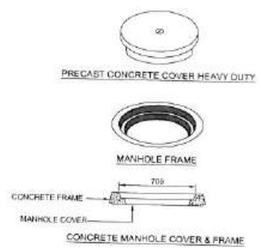
SECTION B-B
SCALE 1: 25



PLAN VIEW
SCALE 1: 25

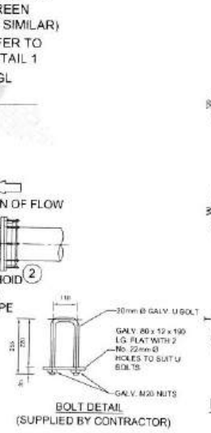


DETAIL 1
SCALE 1:10

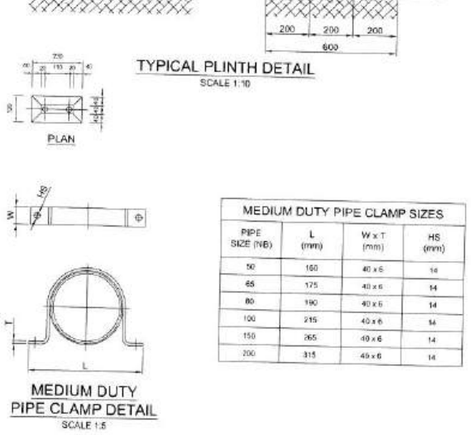


NOTES:
1. PLINTHS TO BE FOUNDED ON COMPACTED MATERIAL (MIN 90% Mod AASHTO)

SECTION A-A
SCALE 1: 25

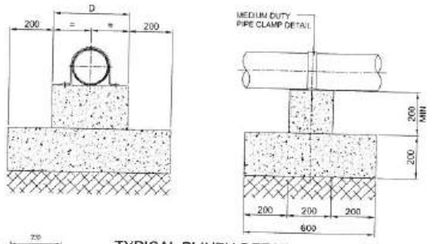


BOLT DETAIL
(SUPPLIED BY CONTRACTOR)



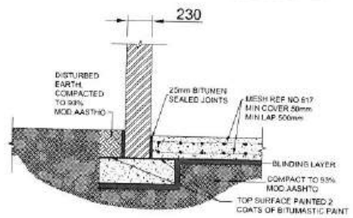
MEDIUM DUTY PIPE CLAMP DETAIL
SCALE 1:5

MEDIUM DUTY PIPE CLAMP SIZES			
PIPE SIZE (NB)	L (mm)	W x T (mm)	HS (mm)
50	160	40 x 6	14
65	175	40 x 6	14
80	190	40 x 6	14
100	215	40 x 6	14
150	265	40 x 6	14
200	315	40 x 6	14

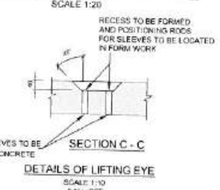


TYPICAL PLINTH DETAIL
SCALE 1:10

PIPE POSITIONING ON PLINTHS				
PIPE SIZE (NB)	PIPE CRS 'A'	PLINTH SIZE 'B'	'C'	'D'
50	165	600	400	200
65	185	650	450	200
80	195	650	450	300
100	220	750	500	300
150	275	900	600	350
200	330	1050	700	400



DETAIL OF BRICK COLUMN BASE
SCALE 1:20



DETAILS OF LIFTING EYE
SCALE 1:10
5 No. OFF
(SUPPLIED BY CONTRACTOR)

PRESSURE REDUCING VALVE

STEEL PIPE FITTINGS AND ITEM LIST

ITEM NR.	DESCRIPTION	DIMENSIONS	QUANTITY	FLANGE TABLE
1	Ø FLANGE ADAPTOR FOR STEEL/UPVC CLASS 16 PIPE		2	SABS 1123 TABLE 1600
2	Ø x200 FLANGED REDUCER		2	
3	200Ø DOUBLE FLANGED STEEL PIPE WITH A PRESSURE TRANSMITTER (EXCLUDING PRESSURE GAUGE) AND PUDDLE FLANGE		2	
4	200 x 100 FLANGED REDUCING TEE		2	
5	200Ø NB ISOLATING WEDGE TYPE GATE VALVE		2	
6	200Ø DOUBLE FLANGED DISTANCE PIECE WITH CLAMP PRESSURE TRANSMITTER		1	
7	200Ø FLANGED STRAINER		1	
8	200Ø DOUBLE FLANGED DISTANCE PIECE WITH CLAMP		1	
9	200Ø PRESSURE REDUCING VALVE		1	
10	100Ø DOUBLE FLANGED DISTANCE PIECE		2	
11	100Ø x 90° FLANGED STEEL BEND		2	
12	100Ø NB ISOLATING WEDGE TYPE GATE VALVE		2	
13	100Ø DOUBLE FLANGED DISTANCE PIECE		2	
14	100Ø PRESSURE REDUCING VALVE		1	
15	100Ø DOUBLE FLANGED DISTANCE PIECE		2	
16	100Ø MEINECKE TURBINE COSMOS WPD WATER METER (OR SIMILAR APPROVED), PN16, BOTH ENDS FLANGED TO SABS 1123 - 1600/3		1	
17	100Ø FLANGED STRAINER		1	
18	100Ø MEINECKE TURBINE COSMOS WPD WATER METER (OR SIMILAR APPROVED), PN16, BOTH ENDS FLANGED TO SABS 1123 - 1600/3		2	
19	200NB x 80NB FLANGED UNEQUAL TEE (AIR ACCUMULATOR) FLANGES DRILLED TO SANS 1123-1600/3		1	
20	FLANGED RISER PIECE, ONE END FLANGED TO SUIT AIR VALVE, OTHER END FLANGED TO SUIT 80NB, FLANGES DRILLED TO SANS 1123-1600/3		1	
21	80NB FLANGED, PN16, RSV; (TO JOHANNESBURG WATER SPECIFICATIONS)		1	
22	50mm VENT-O-MAT AIR VALVE ; TYPE 060 RBX 1601		1	
23	200Ø DOUBLE FLANGED DISTANCE PIECE		2	

GENERAL NOTES:
1. ALL BRICKWORK TO BE PLASTERED EXTERNALLY AND INTERNALLY TO ENSURE WATERTIGHT CHAMBER. USE ENGINEERING BRICKS.
2. CONCRETE FOR THE BASE AND ROOF SLAB TO BE GRADE 25/19. COVER TO REINFORCEMENT = 30mm.
3. ALL FITTINGS TO BE PAINTED WITH COPON KS1888 EPOXY PAINT. AFTER INSTALLATION 5mm - EPSW REPAIR WRAP COATING.
4. ALL FLANGES TO TABLE 1600 OF SANS 1123.
5. PIPES TO BE WRAPPED WITH 6mm THICK MALTHOID WRAPPING THROUGH WALLS.
6. CHAMBER DIMENSION AND DEPTH ARE SUBJECT TO CHANGE UPON CONFIRMATION OF THE EXISTING PIPE LOCATION AND DEPTH.
7. FITTINGS ARE SUBJECT TO CHANGE UPON CONFIRMATION OF THE EXISTING PIPE MATERIALS.
8. EVERY CHAMBER MUST HAVE A 150mm DIAMETER VENT PIPE WITH MOSQUITO GAUZE.
9. PEDESTALS TO BE PROVIDED AS DIRECTED BY THE ENGINEER AT SITE.
10. VALVE KEY HOLES TO BE PROVIDED IN THE ROOF ABOVE EVERY VALVE OR AS DIRECTED.
11. DEPTH OF CHAMBERS 2m MAXIMUM HEIGHT OF BRICK CHAMBER.
12. ENGINEERING BRICKS WITH BRICKFORCE EVERY 3rd COURSE FOR ALL CHAMBERS.
13. ROOF SLAB TO BE MADE OF PRECAST PANELS.
14. 230mm BRICK WALL OF 1m HIGH FROM BASE SLAB.

PRESSURE REDUCING VALVE(CLAYTON + ANTI CAVITATION RING)

ALL PRV SHALL COMPLY WITH FOLLOWING SPECIFICATIONS:

a. 6900-0 1ADECS/ x101 PRESSURE REDUCING VALVES.
b. DUCTILE IRON BODY AND COVER WITH STAINLESS STEEL TRIM.
c. FUSION BONDED EPOXY COATED INTERNALLY AND EXTERNALLY TO A MINIMUM OF 250 MICRONS PN 25 RATED.
d. COMPLETE WITH FULLY ADJUSTABLE CRD PRESSURE REDUCING PILOT VALVE (ADJUSTABLE DOWNSTREAM BETWEEN 2.1 BARS AND 21 BARS).
e. WITH PRESSURE GAUGE, OPENING AND CLOSING SPEED CONTROLS AND x101 VISION POSITION INDICATOR.
f. MUST BE FLANGED AND DRILLED TO SANS 1123 TABLE 1600. INCLUDING CUTTING OF PIPE/COUPLING etc.
g. MUST BE COMPLETE WITH H-TYPE STRAINER-DUCTILE IRON BODY AND COVER-STAINLESS STEEL REMOVABLE IN A DUCTILE IRON FUSION BONDED EPOXY COATED FRAME 2mm MESH-FUSION BONDED EPOXY INTERNALLY AND EXTERNALLY TO A MINIMUM OF 250mm MICRON - PN 25 RATED. FLANGED AND DRILLED TO SANS 1123 TABLE 1600 FACE TO FACE = 300mm
h. WALLS TO BE REINFORCEMENT CONCRETE.

CONSULTING ENGINEERS CAPEX DESIGN SECTION SWISS HOUSE 7TH FLOOR	DESIGNED	B.M.KHUMALO	MAY 2017
	DRAWN	B.M.KHUMALO	MAY 2017
	CHECKED	J.GUMBO	DATE 18/7/17
		SIGNATURE	ECSA REG. No. 20137800144
	APPROVED BY:	T.JIMANDAGUVA	DATE
		SIGNATURE	ECSA REG. No. 20170150

Johannesburg Water

17 HARRISON STREET
MARSHALLTOWN
2107

TEL: (011) 688-1400

FAX: (011) 688-1529

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STANDARD DETAIL
TYPICAL 200Ø PRESSURE REDUCING VALVE CHAMBER

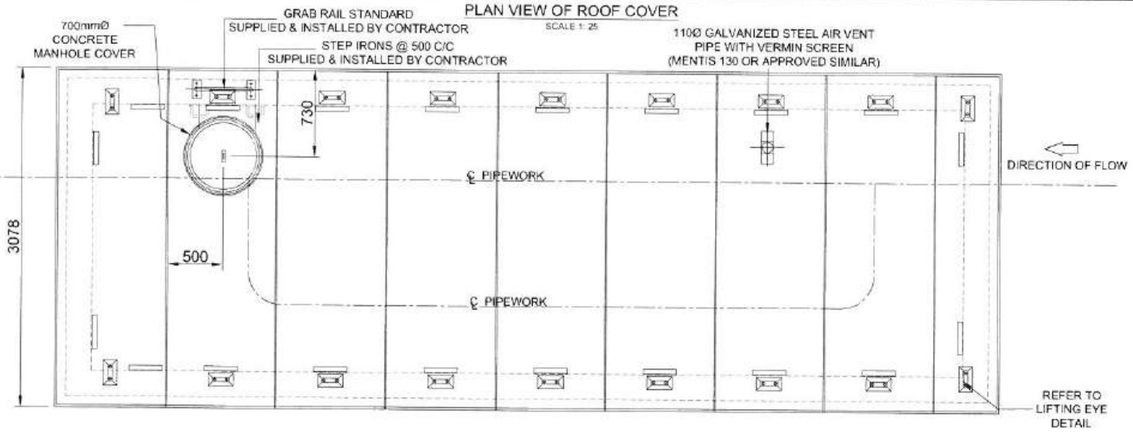
AMENDMENTS				
SCALE	REV.	DESCRIPTION	APPROVED	DATE

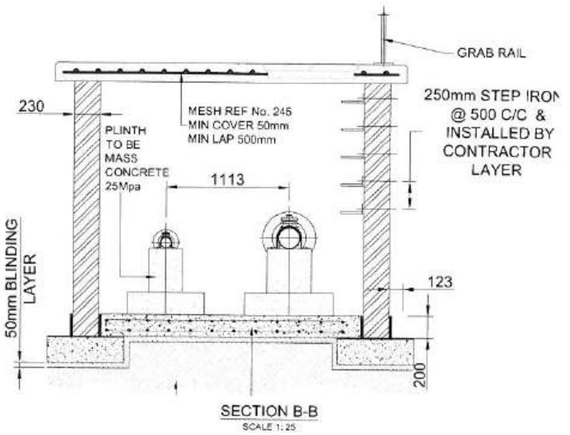
DRAWING No. JW100-DET10.3-W01

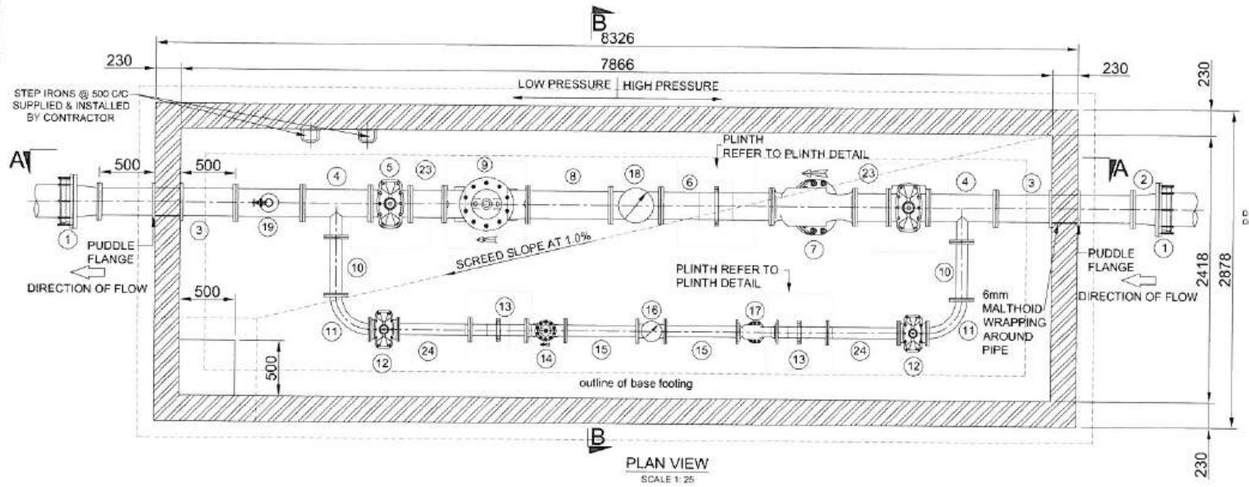
PROJECT No. | REV.

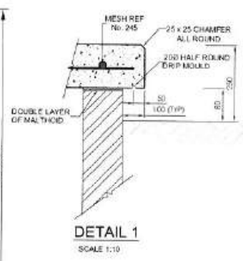
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FILE No.











PRESSURE REDUCING VALVE

STEEL PIPE FITTINGS AND ITEM LIST

ITEM NR.	DESCRIPTION	DIMENSIONS	QUANTITY	FLANGE TABLE
1	Ø FLANGE ADAPTOR FOR STEEL/PVC CLASS 16 PIPE		2	
2	Ø x250 FLANGED REDUCER		2	
3	250Ø DOUBLE FLANGED STEEL PIPE WITH A PRESSURE TRANSMITTER (EXCLUDING PRESSURE GAUGE) AND PUDDLE FLANGE		2	
4	250 x 100 FLANGED REDUCING TEE		2	
5	250Ø NB ISOLATING WEDGE TYPE GATE VALVE		2	
6	250Ø DOUBLE FLANGED DISTANCE PIECE WITH CLAMP PRESSURE TRANSMITTER		1	
7	250Ø FLANGED STRAINER		1	
8	250Ø DOUBLE FLANGED DISTANCE PIECE WITH CLAMP		1	
9	250Ø PRESSURE REDUCING VALVE		1	
10	100Ø DOUBLE FLANGED DISTANCE PIECE		2	
11	100Ø x 90° FLANGED STEEL BEND		2	
12	100Ø NB ISOLATING WEDGE TYPE GATE VALVE		2	
13	100Ø DOUBLE FLANGED DISTANCE PIECE		2	
14	100Ø PRESSURE REDUCING VALVE		1	
15	100Ø DOUBLE FLANGED DISTANCE PIECE		2	
16	100Ø MEINECKE TURBINE COSMOS WPD WATER METER (OR SIMILAR APPROVED), PN16, BOTH ENDS FLANGED TO SABS 1123 - 1600/3.		1	
17	100Ø FLANGED STRAINER		1	
18	250Ø MEINECKE TURBINE COSMOS WPD WATER METER (OR SIMILAR APPROVED), PN16, BOTH ENDS FLANGED TO SABS 1123 - 1600/3.		2	
19	250NB x 80NB FLANGED UNEQUAL TEE (AIR ACCUMULATOR), FLANGES DRILLED TO SANS 1123/1600/3		1	
20	FLANGED RISER PIECE, ONE END FLANGED TO SUIT AIR VALVE, OTHER END FLANGED TO SUIT 80NB, FLANGES DRILLED TO SANS 1123-1600/3.		1	
21	80NB FLANGED, PN 16, RSV, (TO JOHANNESBURG WATER SPECIFICATIONS).		1	
22	80mm VENT-O-MAT AIR VALVE TYPE 080 RBX 1601		1	
23	250Ø DOUBLE FLANGED DISTANCE PIECE		2	
24	100Ø DOUBLE FLANGED DISTANCE PIECE		2	

SABS 1123 TABLE 1600

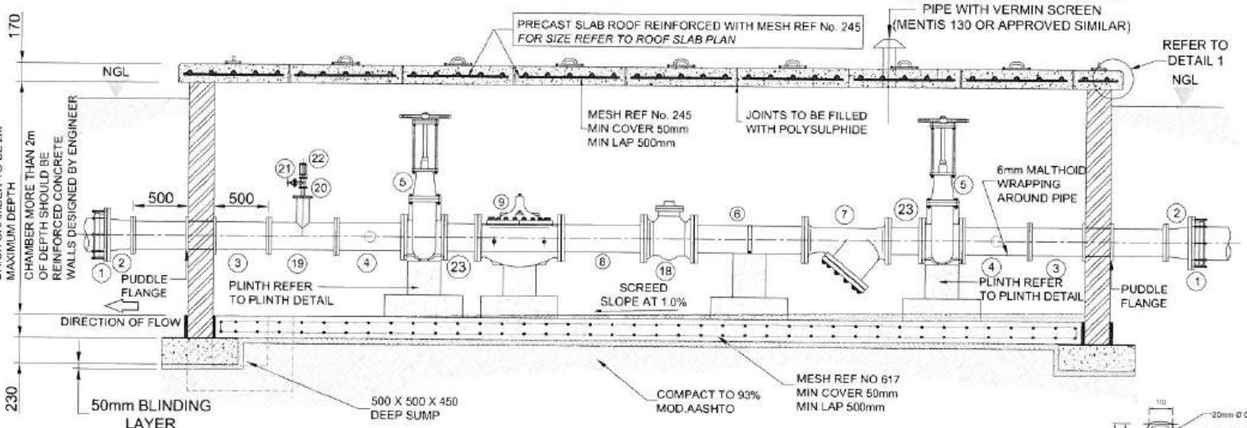
GENERAL NOTES:

1. ALL BRICKWORK TO BE PLASTERED EXTERNALLY AND INTERNALLY TO ENSURE WATERTIGHT CHAMBER. USE ENGINEERING BRICKS.
2. CONCRETE FOR THE BASE AND ROOF SLAB TO BE GRADE 25/19. COVER TO REINFORCEMENT = 30mm
3. ALL FITTINGS TO BE PAINTED WITH COPON KS/BB EPOXY PAINT. AFTER INSTALLATION 5mm BRIGHT REPAIR WRAP COATING.
4. ALL FLANGES TO TABLE 1600 OF SANS 1123
5. PIPES TO BE WRAPPED WITH 6mm THICK MALTHOID WRAPPING THROUGH WALLS.
6. CHAMBER DIMENSION AND DEPTH ARE SUBJECT TO CHANGE UPON CONFIRMATION OF THE EXISTING PIPE LOCATION AND DEPTH.
7. FITTINGS ARE SUBJECT TO CHANGE UPON CONFIRMATION OF THE EXISTING PIPE MATERIALS.
8. EVERY CHAMBER MUST HAVE A 100mm DIAMETER VENT PIPE WITH DOWN TO GAUGE.
9. PEDESTALS TO BE PROVIDED AS DIRECTED BY THE ENGINEER AT SITE.
10. VALVE KEY HOLES TO BE PROVIDED IN THE ROOF ABOVE EVERY VALVE OR AS DIRECTED.
11. DEPTH OF CHAMBERS 2m MAXIMUM HEIGHT OF BRICK CHAMBER.
12. ENGINEERING BRICKS WITH BRICK-FORCE EVERY 3rd COURSE FOR ALL CHAMBERS.
13. ROOF SLAB TO BE MADE OF PRECAST PANELS.
14. 230mm BRICK WALL OF 1m HIGH FROM BASE SLAB.

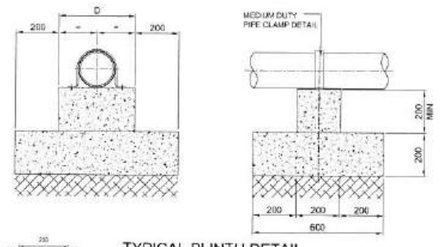
PRESSURE REDUCING VALVE(CLAYTON + ANTI CAVITATION RING)

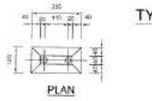
ALL PRV SHALL COMPLY WITH FOLLOWING SPECIFICATIONS.

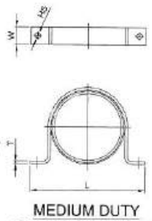
a. 590G-01ABECSI X101 PRESSURE REDUCING VALVES.
b. DUCTILE IRON BODY AND COVER WITH STAINLESS STEEL TRIM.
c. FUSION BONDED EPOXY COATED INTERNALLY AND EXTERNALLY TO A MINIMUM OF 250 MICRONS PN 25 RATED.
d. COMPLETE WITH FULLY ADJUSTABLE CRD PRESSURE REDUCING PILOT VALVE (ADJUSTABLE DOWNSTREAM BETWEEN 2.1 BARS AND 21 BARS).
e. WITH PRESSURE GAUGE, OPENING AND CLOSING SPEED CONTROLS AND +161 VISION POSITION INDICATOR.
f. MUST BE FLANGED AND DRILLED TO SANS 1123 TABLE 1600, INCLUDING CUTTING OF PIPES,COUPLING etc.
g. MUST BE COMPLETE WITH H-TYPE STRAINER-DUCTILE IRON BODY AND COVER-STAINLESS STEEL REMOVABLE M A DUCTILE IRON FUSION BONDED EPOXY COATED FRAME 2mm MESH-FUSION BONDED EPOXY INTERNALLY AND EXTERNALLY TO A MINIMUM OF 250 mm MICRON - PN 25 RATED FLANGED AND DRILLED TO SANS 1123 TABLE 1600 FACE TO FACE = 500mm
h. WALLS TO BE REINFORCEMENT CONCRETE.

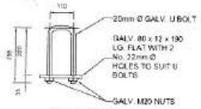


SECTION A-A
SCALE 1: 25









MEDIUM DUTY PIPE CLAMP SIZES

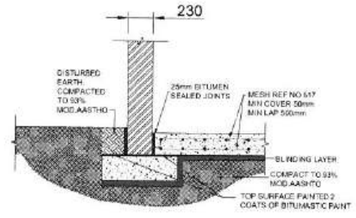
PIPE SIZE (NB)	L (mm)	W x T (mm)	HS (mm)
50	160	40 x 6	14
65	175	40 x 6	14
80	190	40 x 6	14
100	215	40 x 6	14
150	265	40 x 6	14
200	315	40 x 6	14

NOTES:

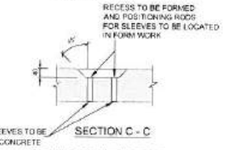
1. PLINTHS TO BE FOUNDED ON COMPACTED MATERIAL (MIN 93% Mod AASHTO)

PIPE POSITIONING ON PLINTHS

PIPE SIZE (NB)	PIPE CRS 'A'	PLINTH SIZE 'B'	'C'	'D'
50	165	600	400	200
65	185	650	450	200
80	190	650	450	300
100	220	750	500	300
150	275	900	600	350
200	330	1050	700	400



DETAIL OF BRICK COLUMN BASE
SCALE 1:20



DETAILS OF LIFTING EYE
SCALE 1:10
8 No. OFF
(SUPPLIED BY CONTRACTOR)

CONSULTING ENGINEERS CAPEX DESIGN SECTION SWISS HOUSE 7TH FLOOR	DESIGNED	G.M.KHUMALO	MAY 2017
	DRAWN	S.M.KHUMALO	MAY 2017
	CHECKED	J.GUMBO	DATE 19/7/2017
		SIGNATURE	
		ECSA REG. No.	20137044
	APPROVED BY:	T.MPANDAGUTA	DATE
		SIGNATURE	
		ECSA REG. No.	20170150

Johannesburg Water

17 HARRISON STREET
MARSHALLTOWN
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FAX: (011) 688-1529

Joburg

STANDARD DETAIL

TYPICAL 250Ø PRESSURE REDUCING VALVE CHAMBER

AMENDMENTS

SCALE	REV.	DESCRIPTION	APPROVED	DATE

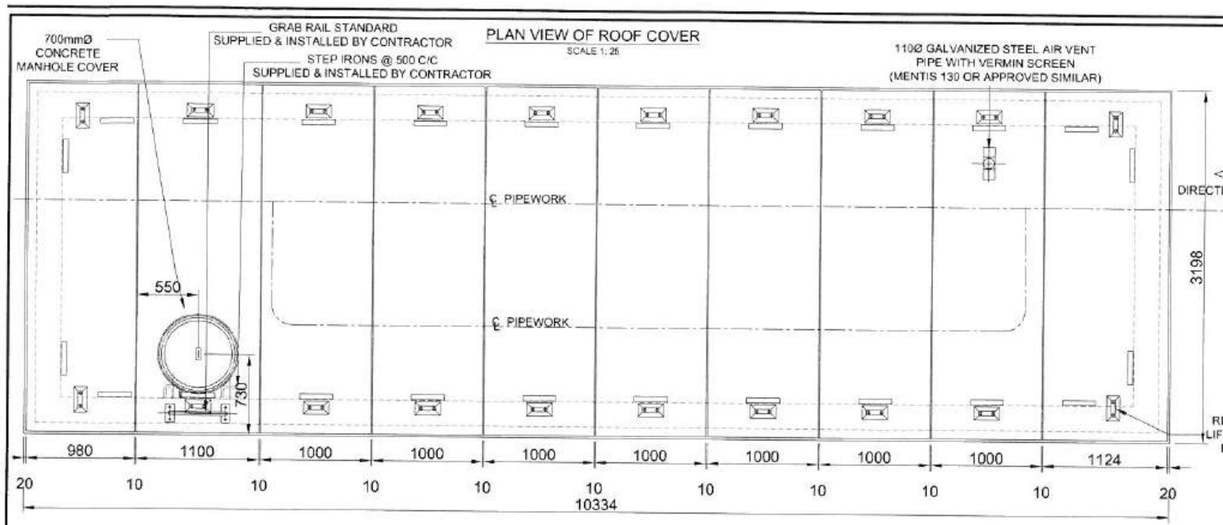
DRAWING No. JW100-DET10.4-W01

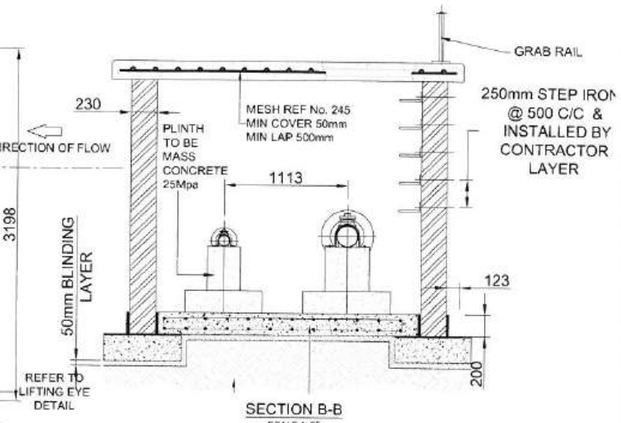
PROJECT No. | REV.

A3 | SHEET 10.4 | OF

ORIGINAL PAGE SIZE

FILE No.





PRESSURE REDUCING VALVE

STEEL PIPE FITTINGS AND ITEM LIST

ITEM NR.	DESCRIPTION	DIMENSIONS	QUANTITY	FLANGE TABLE
1	Ø FLANGE ADAPTOR FOR STEEL/UPVC CLASS 16 PIPE		2	SABS 1123 TABLE 1600
2	Ø300 FLANGED REDUCER		2	
3	300Ø DOUBLE FLANGED STEEL PIPE WITH A PRESSURE TRANSMITTER (EXCLUDING PRESSURE GAUGE) AND PUDDLE FLANGE		2	
4	300 x 150 FLANGED REDUCING TEE		2	
5	300Ø NB ISOLATING WEDGE TYPE GATE VALVE		2	
6	300Ø DOUBLE FLANGED DISTANCE PIECE WITH CLAMP PRESSURE TRANSMITTER		1	
7	300Ø FLANGED STRAINER		1	
8	300Ø DOUBLE FLANGED DISTANCE PIECE WITH CLAMP		1	
9	300Ø PRESSURE REDUCING VALVE		1	
10	150Ø DOUBLE FLANGED DISTANCE PIECE		2	
11	150Ø x 90° FLANGED STEEL BEND		2	
12	150Ø NB ISOLATING WEDGE TYPE GATE VALVE		2	
13	150Ø DOUBLE FLANGED DISTANCE PIECE		2	
14	150Ø PRESSURE REDUCING VALVE		1	
15	150Ø DOUBLE FLANGED DISTANCE PIECE		2	
16	150Ø MEINECKE TURBINE COSMOS WP/D WATER METER (OR SIMILAR APPROVED), PN16, BOTH ENDS FLANGED TO SABS 1123 - 1600/3		1	
17	150Ø FLANGED STRAINER		1	
18	200Ø MEINECKE TURBINE COSMOS WP/D WATER METER (OR SIMILAR APPROVED), PN16, BOTH ENDS FLANGED TO SABS 1123 - 1600/3		2	
19	200NB x 80NB FLANGED UNEQUAL TEE (AIR ACCUMULATOR), FLANGES DRILLED TO SANS 1123-1600/3		1	
20	FLANGED RISER PIECE, ONE END FLANGED TO SUIT AIR VALVE, OTHER END FLANGED TO SUIT 80NB, FLANGES DRILLED TO SANS 1123-1600/3		1	
21	80NB FLANGED, PN 16, PBV, (TO JOHANNESBURG WATER SPECIFICATIONS)		1	
22	80mm VENT-O-MAT AIR VALVE TYPE 060 REK 1601		1	
23	300Ø DOUBLE FLANGED DISTANCE PIECE		2	
24	150Ø DOUBLE FLANGED DISTANCE PIECE		2	

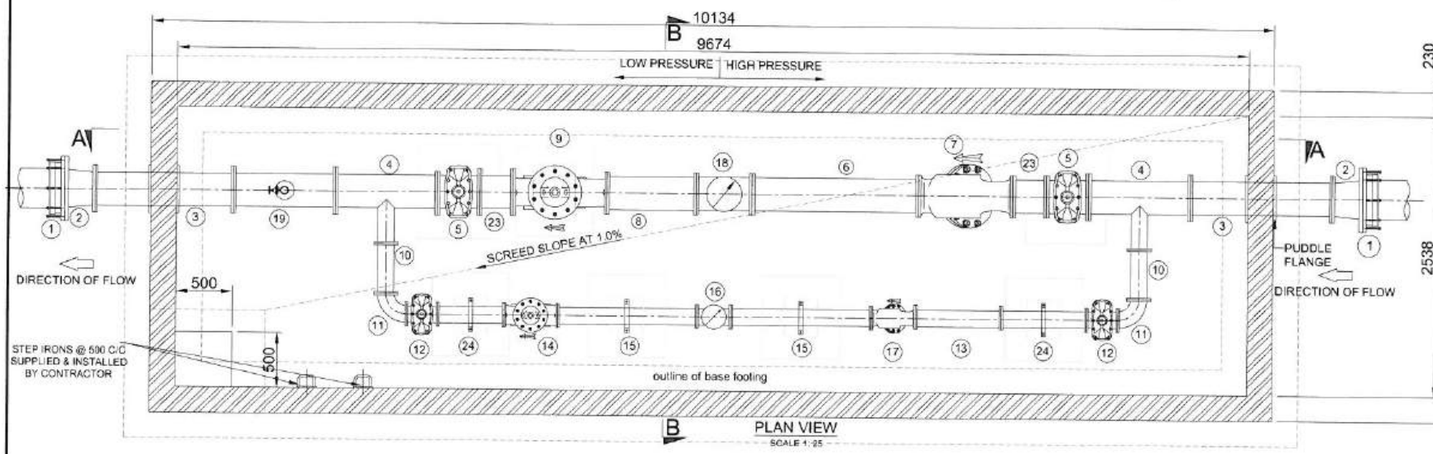
GENERAL NOTES:

1. ALL BRICKWORK TO BE PLASTERED EXTERNALLY AND INTERNALLY TO ENSURE WATERTIGHT CHAMBER. USE ENGINEERING BRICKS.
2. CONCRETE FOR THE BASE AND ROOF SLAB TO BE GRADE 25/19. COVER TO REINFORCEMENT = 30mm.
3. ALL FITTINGS TO BE PAINTED WITH COPON KSR/38 EPOXY PAINT. AFTER INSTALLATION 5mm BRUSH REPAIR WRAP COATING.
4. ALL FLANGES TO TABLE 1600 OF SANS 1123.
5. PIPES TO BE WRAPPED WITH 6mm THICK MALTHOID WRAPPING THROUGH WALLS.
6. CHAMBER DIMENSION AND DEPTH ARE SUBJECT TO CHANGE UPON CONFIRMATION OF THE EXISTING PIPE LOCATION AND DEPTH.
7. FITTINGS ARE SUBJECT TO CHANGE UPON CONFIRMATION OF THE EXISTING PIPE MATERIALS.
8. EVERY CHAMBER MUST HAVE A 100mm DIAMETER VENT PIPE WITH MOSQUITO GAUZE.
9. PEDESTALS TO BE PROVIDED AS DIRECTED BY THE ENGINEER AT SITE.
10. VALVE KEY HOLES TO BE PROVIDED IN THE ROOF ABOVE EVERY VALVE OR AS DIRECTED.
11. DEPTH OF CHAMBERS 2m MAXIMUM HEIGHT OF BRICK CHAMBER.
12. ENGINEERING BRICKS WITH BRICK-FORCE EVERY 3rd COURSE FOR ALL CHAMBERS.
13. ROOF SLAD TO BE MADE OF PRECAST PANELS.
14. 230mm BRICK-WALL OF 1m HIGH FROM BASE SLAB.

PRESSURE REDUCING VALVE(CLAYTON + ANTI CAVITATION RING)

ALL PRV SHALL COMPLY WITH FOLLOWING SPECIFICATIONS:

a. 600Q-01ABECS1 x101 PRESSURE REDUCING VALVES.
b. DUCTILE IRON BODY AND COVER WITH STAINLESS STEEL TRIM.
c. FUSION BONDED EPOXY COATED INTERNALLY AND EXTERNALLY TO A MINIMUM OF 250 MICRONS PN 25 RATED.
d. COMPLETE WITH FULLY ADJUSTABLE CRD PRESSURE REDUCING PILOT VALVE (ADJUSTABLE DOWNSTREAM BETWEEN 2.1 BARS AND 21 BARS).
e. WITH PRESSURE GAUGE, OPENING AND CLOSING SPEED CONTROLS AND x101 VISION POSITION INDICATOR.
f. MUST BE FLANGED AND DRILLED TO SANS 1123 TABLE 1600, INCLUDING CUTTING OF PIPES,COUPLING etc.
g. MUST BE COMPLETE WITH H-TYPE STRAINER-DUCTILE IRON BODY AND COVER-STAINLESS STEEL REMOVABLE IN A DUCTILE IRON FUSION BONDED EPOXY COATED FRAME 2mm MESH-FUSION BONDED EPOXY INTERNALLY AND EXTERNALLY TO A MINIMUM OF 250mm MICRON - PN 25 RATED FLANGED AND DRILLED TO SANS 1123 TABLE 1600 FACE TO FACE = 900mm
h. WALLS TO BE REINFORCEMENT CONCRETE.



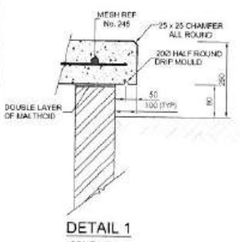


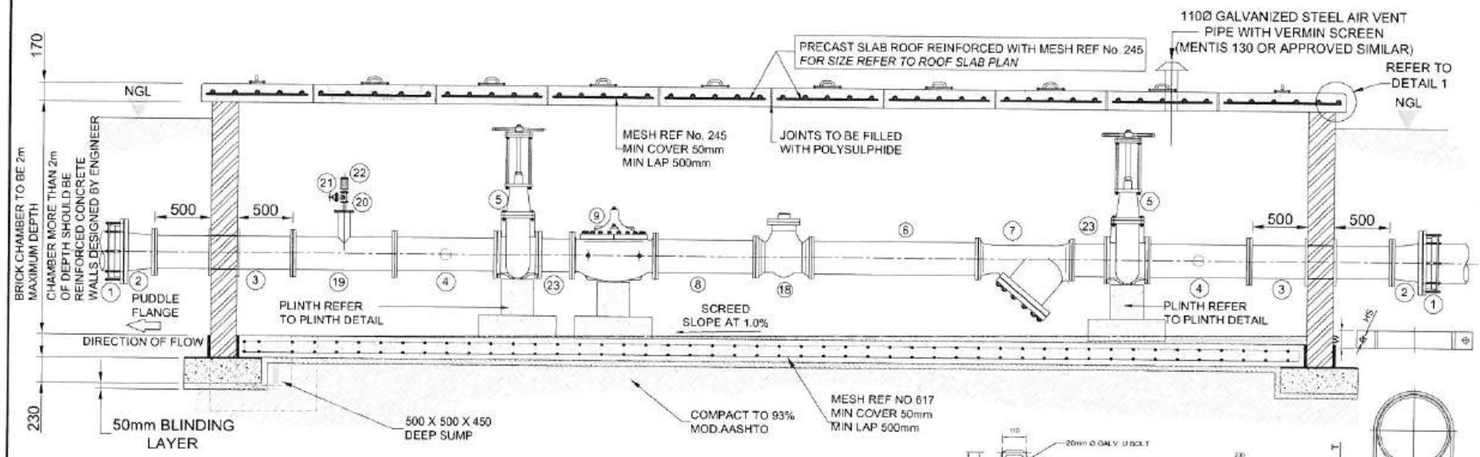
NOTES:

1. PLINTHS TO BE FOUNDED ON COMPACTED MATERIAL (MIN 90% Mod AASHTO)

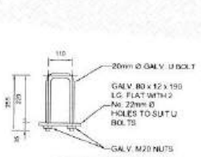
PIPE POSITIONING ON PLINTHS

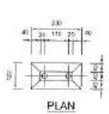
PIPE SIZE (NB)	PIPE CRS 'A'	PLINTH SIZE 'B'	'C'	'D'
50	165	600	400	200
65	185	650	450	200
80	185	650	450	300
100	220	750	500	300
150	275	900	600	350
200	330	1000	700	400





SECTION A-A
SCALE 1: 25

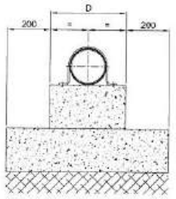




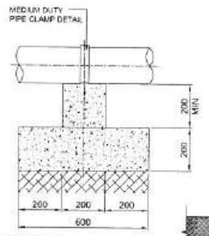


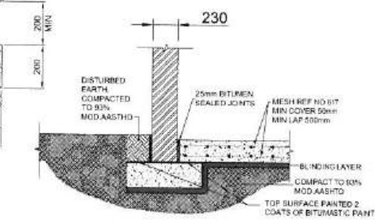
MEDIUM DUTY PIPE CLAMP SIZES

PIPE SIZE (NB)	L (mm)	W x T (mm)	HS (mm)
50	160	40 x 5	14
65	175	40 x 6	14
80	190	40 x 6	14
100	215	40 x 5	14
150	265	40 x 5	14
200	315	40 x 5	14

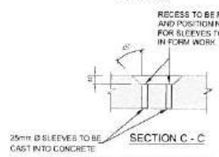


TYPICAL PLINTH DETAIL
SCALE 1:10





DETAIL OF BRICK COLUMN BASE
SCALE 1:20



DETAILS OF LIFTING EYE
SCALE 1:10
5 No. OFF
(SUPPLIED BY CONTRACTOR)

CONSULTING ENGINEERS CAPEX DESIGN SECTION SWISS HOUSE 7TH FLOOR	DESIGNED	B.M.KHUMALO	MAY 2017
	DRAWN	B.M.KHUMALO	MAY 2017
	CHECKED	J.GUMBO	DATE 19/7/17
		SIGNATURE	
		ECSA REG. No.	20137003 4
	APPROVED BY:	T.MPANGALITA	DATE
		SIGNATURE	
		ECSA REG. No.	20117017 30

Johannesburg Water

17 HARRISON STREET
MARSHALLTOWN
2107

TEL: (011) 688-1400

FAX: (011) 688-1529

Joburg

STANDARD DETAIL

TYPICAL 300Ø PRESSURE REDUCING VALVE CHAMBER

AMENDMENTS

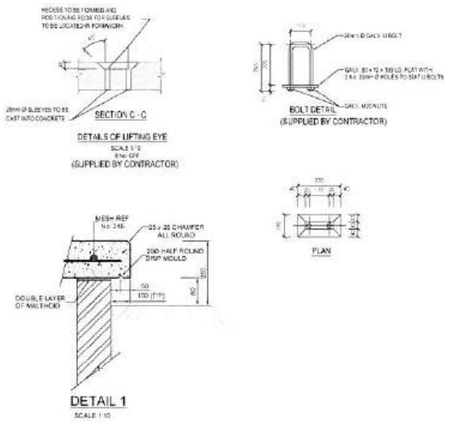
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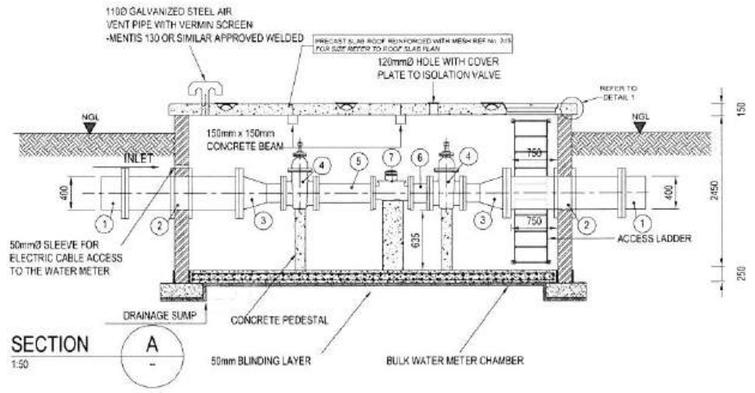
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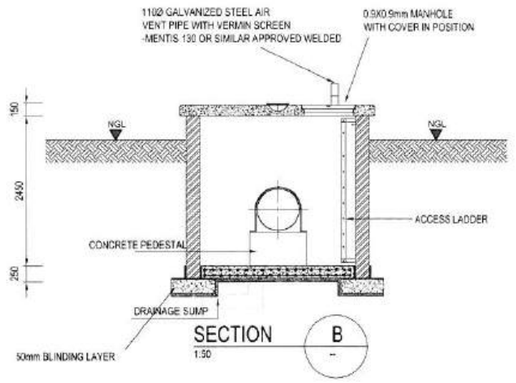
PROJECT No. | REV.

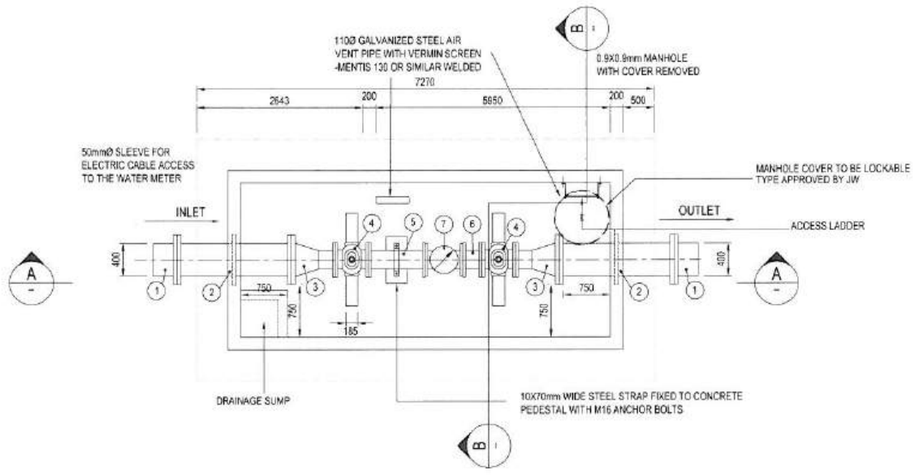
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FILE No.





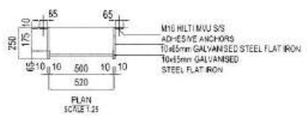


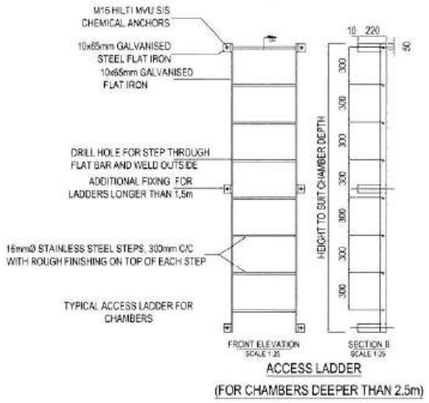


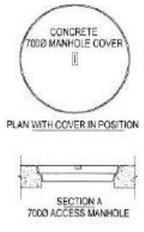
PLAN
400mm WATER FLOW METER AND CHAMBER
SCALE 1 : 50

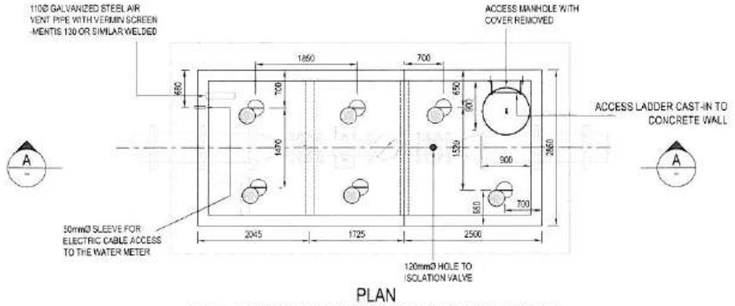
TYPICAL STEEL PIPE FITTINGS AND ITEM LIST
(400ND PIPE LINE WITH 2500kPa MAX. WORKING PRESSURE USED AS AN EXAMPLE)

ITEM NR.	DESCRIPTION	NO. OFF	DIMENSIONS
1	400Ø mm FLANGED PIPE. FLANGED TO SABS1123-1600/3.	2	
2	400Ø x 1500mm LONG STEEL PIPE WITH PUDDLE FLANGE. BOTH ENDS FLANGED SABS 1123 - 1600/3	2	1824, 220
3	400Ø x 300Ø STEEL REDUCER. BOTH ENDS FLANGED SABS 1123 - 1600/3	2	
4	300Ø WEDGE TYPE GATE VALVE (PN16) WITH GEARBOX AND ANTI-CLOCKWISE CLOSING TO SABS 664. BOTH ENDS FLANGED TO SABS 1123 - 1600/3.	2	
5	3xØ STEEL STRAIGHT. BOTH ENDS FLANGED TO SABS 1123 - 1600/3.	1	
6	1xØ STEEL STRAIGHT. BOTH ENDS FLANGED TO SABS 1123 - 1600/3.	1	
7	300mm ON A 400mm (WPO 400T25) SENSUS WP TURBINE METER FLANGED TO BS4504, TABLE 25, WITH PRESSURE RATING:2500kPa AND OPERATIONAL MAXIMUM TEMP OF 50 DEGREES CELSIUS	1	

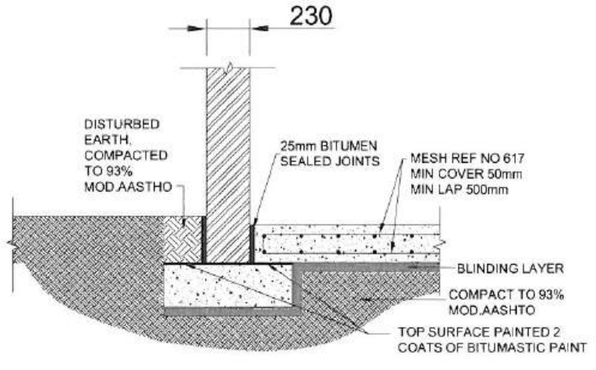








PLAN
400mm Ø WATER FLOW METER CHAMBER CONCRETE DETAIL
SCALE 1 : 50



DETAIL OF BRICK COLUMN BASE
SCALE 1:20

CONSULTING ENGINEERS
CAPEX DESIGN SECTION
SWISS HOUSE
7TH FLOOR

DESIGNED	B.M.KHUMALO	MAY 2017	
DRAWN	B.M.KHUMALO	MAY 2017	
CHECKED	J.DUMSO	DATE 8/7/17	
	SIGNATURE		
	ECSA REG. No.	20127004	
APPROVED BY:	T.MPANDAGUTA	DATE	
	SIGNATURE		
	ECSA REG. No.	20117013	

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Joburg

STANDARD DETAIL
TYPICAL 400mm PIPELINE BULK FLOW METER DETAIL

AMENDMENTS

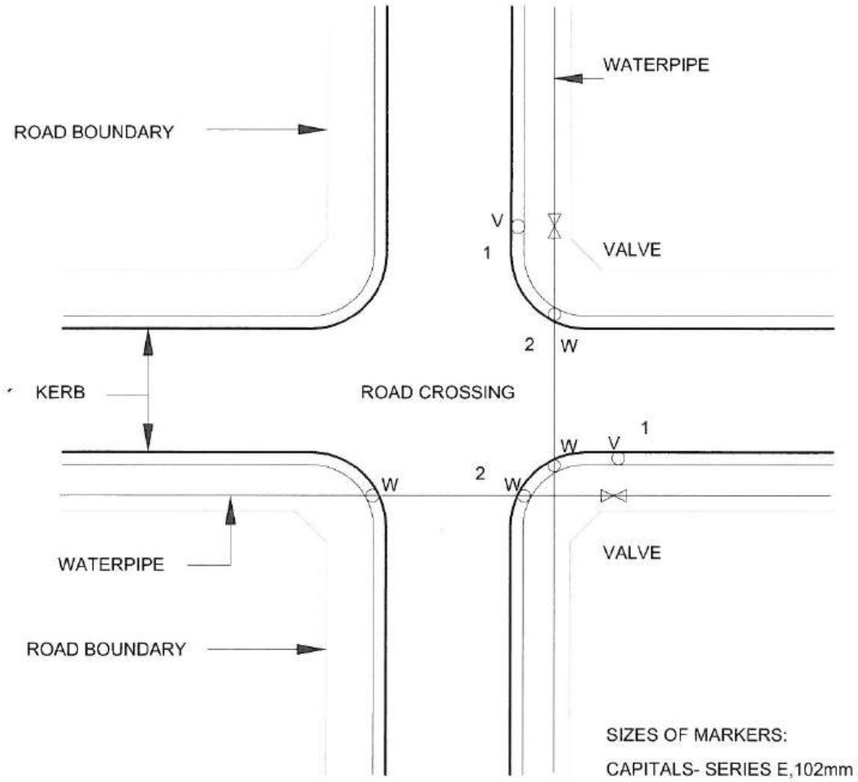
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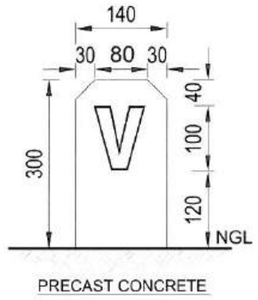
DRAWING No.JW100-DET11-W01

PROJECT No. | REV.

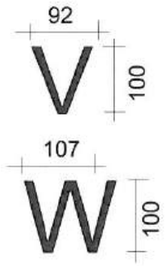
A3 ORIGINAL PAGE SIZE | SHEET 11 OF

FILE No.





PRECAST CONCRETE



NOTE

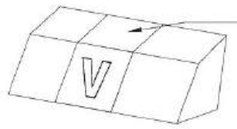
1) TOP SURFACE OF COVERS TO BE PAINTED AS FOLLOWS:
   VALVES NORMALLY OPEN : BLUE
   VALVES NORMALLY CLOSED : SIGNAL RED
   SCOUR VALVES : GREEN
   AIR VALVES : BROWN

(1) VALVE MARKER-"V" MUST BE PAINTED

(2) WATER PIPE MARKER-"W"

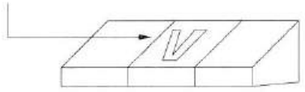
SIZES OF MARKERS:

CAPITALS- SERIES E,102mm IN SIZE ACCORDING TO THE S.A. BOOK OF ROAD SIGNS.



BARRIER KERB

HORIZONTALS, SLOPES & VERTICAL SIDES TO BE PAINTED WITH YELLOW ENAMEL PAINT



MOUNTABLE KERB

DETAILS OF SERVICE MARKERS

CONSULTING ENGINEERS
CAPEX DESIGN SECTION
SWISS HOUSE
7TH FLOOR

DESIGNED: B.M.KHUMALO MAY 2017
DRAWN: B.M.KHUMALO MAY 2017
CHECKED: J.G.UMBO DATE 18/7/17
SIGNATURE
ECSA REG. No 20137006 44
APPROVED BY: T.MPANDAGUTA DATE
SIGNATURE
ECSA REG. No 20111701 50

Johannesburg Water

17 HARRISON STREET
MARSHALLTOWN
2107

TEL: (011) 688-1400
FAX: (011) 688-1529

Joburg

STANDARD DETAIL
DETAILS OF SERVICE MARKERS

AMENDMENTS				
SCALE	REV.	DESCRIPTION	APPROVED	DATE

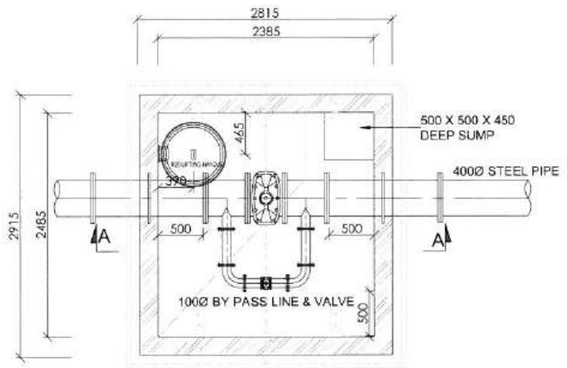
DRAWING No.JW100-DET12-W01

PROJECT No. REV.

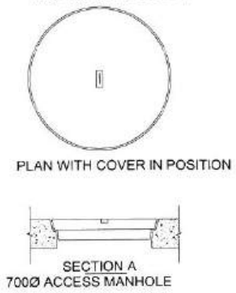
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SHEET 12 OF

FILE No.

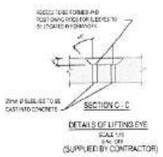


PLAN VIEW
SCALE 1:20

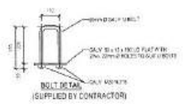


PLAN WITH COVER IN POSITION

SECTION A
700Ø ACCESS MANHOLE



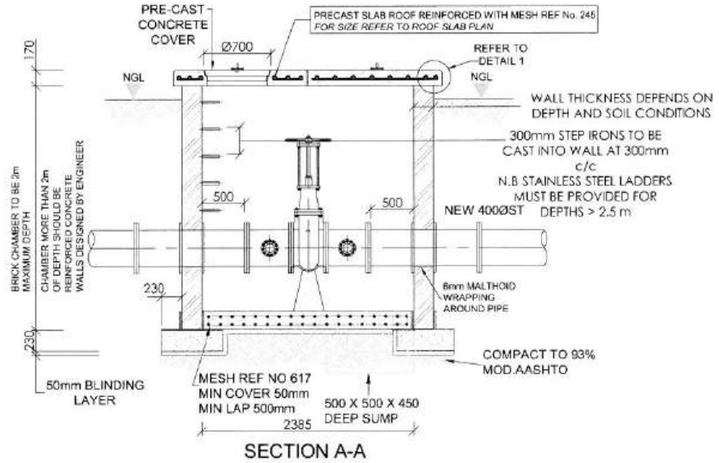
DETAILS OF LIFTING EYE
(SUPPLIED BY CONTRACTOR)



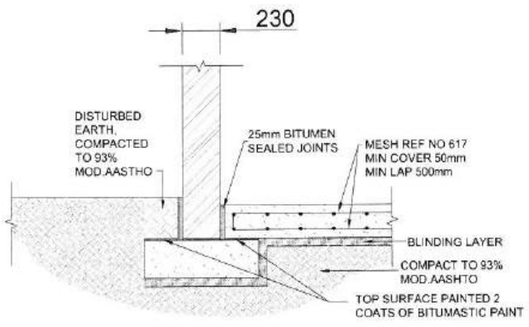
BOLT DETAIL
(SUPPLIED BY CONTRACTOR)



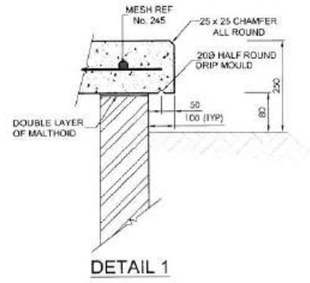
PLAN



SECTION A-A
SCALE 1:20



DETAIL OF BRICK COLUMN BASE



DETAIL 1

CONSULTING ENGINEERS
CAPEX DESIGN SECTION
SWISS HOUSE
7TH FLOOR

DESIGNED	B.M.KHUMALO	MAY 2017
DRAWN	B.M.KHUMALO	MAY 2017
CHECKED	J.G.UMBO	DATE: 18/7/17
	SIGNATURE:	
	ECSA REG. No.: 20137 0044	
APPROVED BY:	T. MPANDAGUTA	DATE:
	SIGNATURE:	
	ECSA REG. No.: 20170150	

Johannesburg Water

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TYPICAL STANDARD DETAIL

TYPICAL VALVE BOXES FOR VALVES 400mm N.B. AND ABOVE

AMENDMENTS

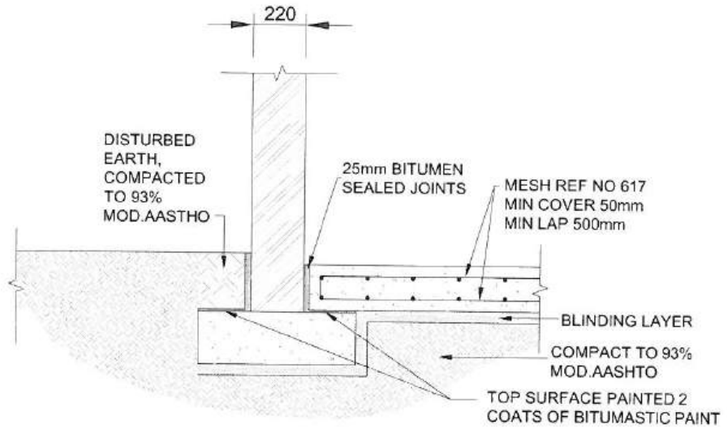
SCALE	REV.	DESCRIPTION	APPROVED	DATE

DRAWING No.JW100-DET13-W01

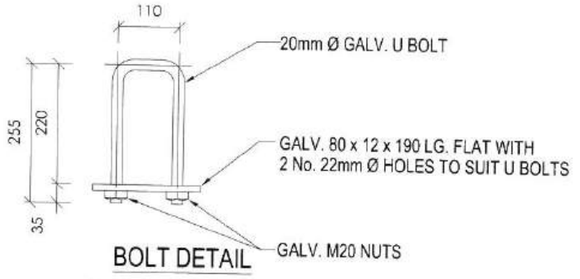
PROJECT No. | REV.

A3 ORIGINAL PAGE SIZE | SHEET 13 OF

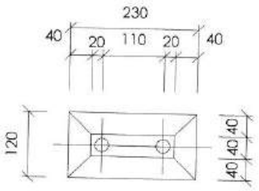
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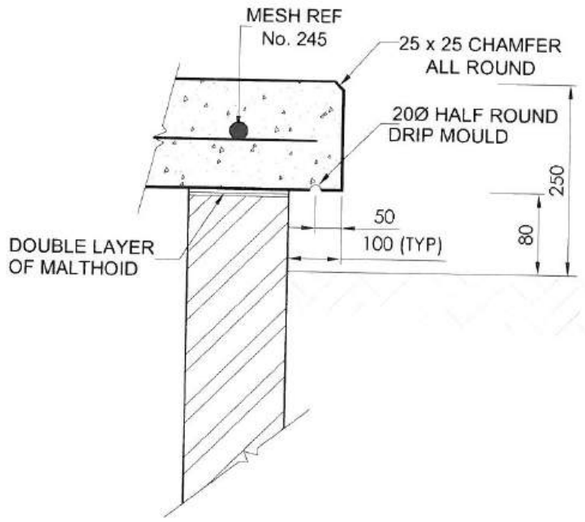
DETAIL OF BRICK COLUMN BASE



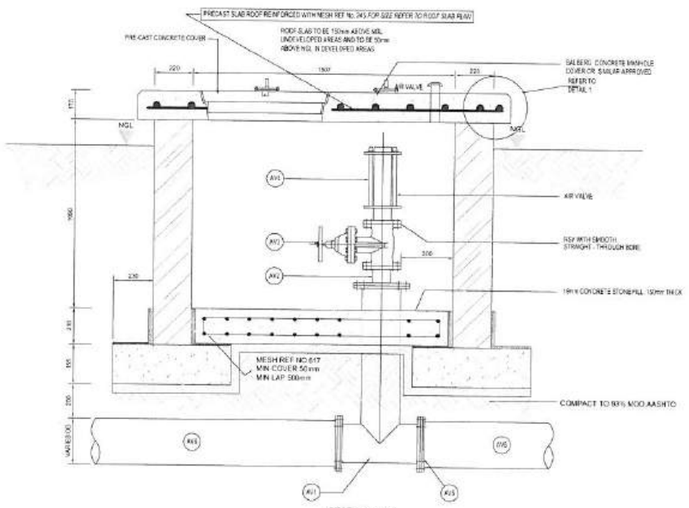
BOLT DETAIL
(SUPPLIED BY CONTRACTOR)



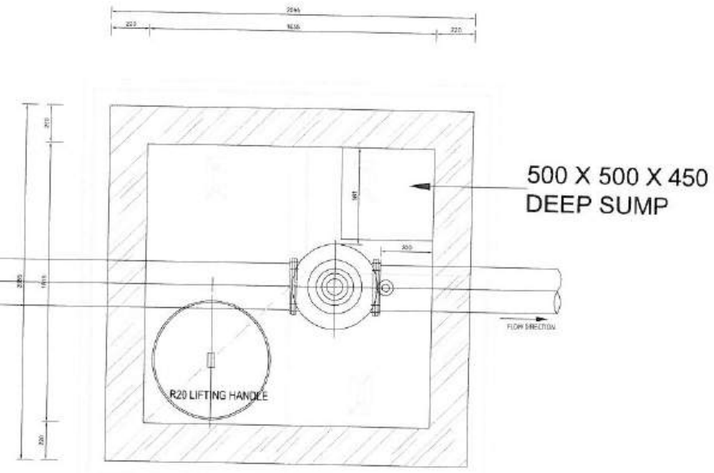
PLAN



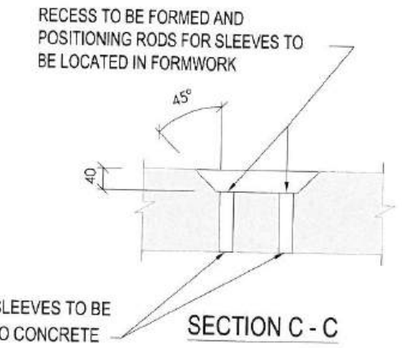
DETAIL 1



SECTION B - B
SCALE 1:15



SECTION B - B
SCALE 1:15



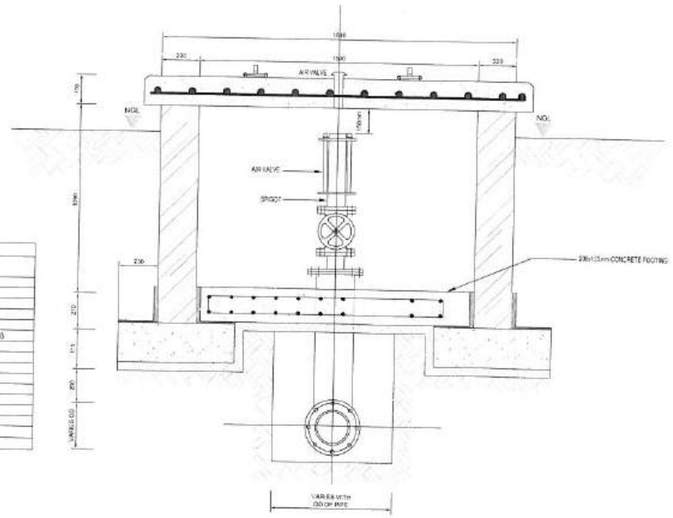
SECTION C - C

DETAILS OF LIFTING EYE

SCALE 1:10
8 No. OFF
(SUPPLIED BY CONTRACTOR)

AIR VALVE DETAIL

MAIN PIPE	FITTING	TOTAL	DIA LEFT	DIA RIGHT	DIA BRANCH	END LEFT	END RIGHT	END BRANCH	FITTING MATERIAL	FITTING CLASS/BAR	INTERNAL LINING SPEC	EXTERNAL COATING SPEC	DRILL TABLE	ANCILLARY DESCRIPTION
355Ø HDPE	AV1	1	230	355	355	FLANGED	FLANGED	FLANGED	STEEL T = 4.5mm	16	FBE	FBE	16/300	355x355mm FLANGED T - PIECE
	AV2	1	100	100		FLANGED	FLANGED		STEEL T = 4.5mm	16	COPON EP2300	COPON EP2300	16/300	300mm DIA BLANK FLANGE WITH 100mm DIA PIPE
	AV3	1	100	100		FLANGED	FLANGED		VARIES	16	COPON EP2300	COPON EP2300	16/300	FLANGED FULL PORT BALL VALVE STAINLESS STEEL PN16 SIZED TO SUIT
	AV4	1	100						COPON EP2300		COPON EP2300	COPON EP2300	16/300	VENT - Ø - MAT AIR VALVE
	AV5	1	355	355		WELDED	FLANGED		HDPE	-	-	-	16/300	HDPE FLANGE RF110 PN16 WITH LOOSE STEEL FLANGE DRILLED TO 16/300
	AV6	-	355	355		WELDED	FLANGED		HDPE	-	-	-		HDPE PIPE RETICULATION PE100 PN16
315Ø UPVC	AV1	1	300	300	300	FLANGED	FLANGED	FLANGED	STEEL T = 4.5mm	16	FBE	FBE	16/300	355x355mm FLANGED T - PIECE
	AV2	1	100	100		FLANGED	FLANGED		STEEL T = 4.5mm	16	COPON EP2300	COPON EP2300	16/300	280mm DIA BLANK FLANGE WITH 100mm DIA PIPE
	AV3	1	100	100		FLANGED	FLANGED		VARIES	16	COPON EP2300	COPON EP2300	16/300	FLANGED FULL PORT BALL VALVE STAINLESS STEEL PN16 SIZED TO SUIT
	AV4	1	100							16	COPON EP2300	COPON EP2300	16/300	VENT - Ø - MAT AIR VALVE
	AV5	1	300	300		SOCKET	FLANGED		STEEL	16	COPON EP2300	COPON EP2300	16/300	VIKING JOHNSON FLANGE ADAPTO TO SUIT PIPE
	AV6	-	315	315		SPIGOT	SOCKET		uPVC	16	-	-		uPVC PIPE RETICULATION



SECTION A-A

CONSULTING ENGINEERS
CAPEX DESIGN SECTION
SWISS HOUSE
7TH FLOOR

DESIGNED	B.M.KHUMALO	MAY 2017	
DRAWN	B.M.KHUMALO	MAY 2017	
CHECKED	J.GUMBO	DATE: 18/7/17	
	SIGNATURE:		
	ECSA REG. No:	2013 700 44	
APPROVED BY:	T.MPANDAGUTA	DATE:	
	SIGNATURE:		
	ECSA REG. No:	20170770	

Johannesburg Water

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TYPICAL STANDARD DETAIL
AIR VALVE CHAMBER AND LOCKING DEVICE DETAILS
AT NODE LW1, LW6 AND LW15

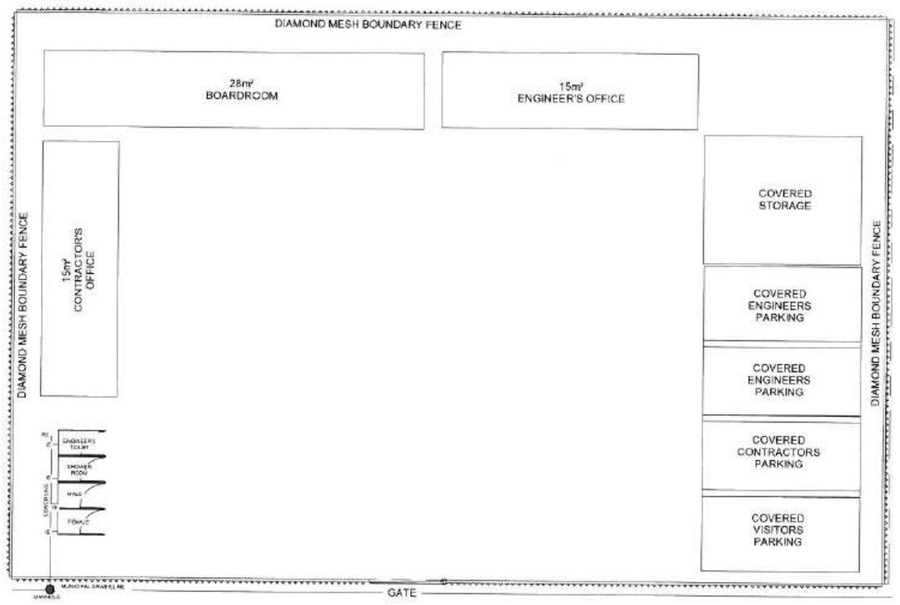
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SCALE	REV:	DESCRIPTION	APPROVED	DATE

DRAWING No.JW100-DET14-W01

PROJECT No | REV.

A3 ORIGINAL PAGE SIZE | SHEET 14a OF

FILE No



1 GROUND SETTING OUT
1 : 100



3 East Elevation
1 : 100



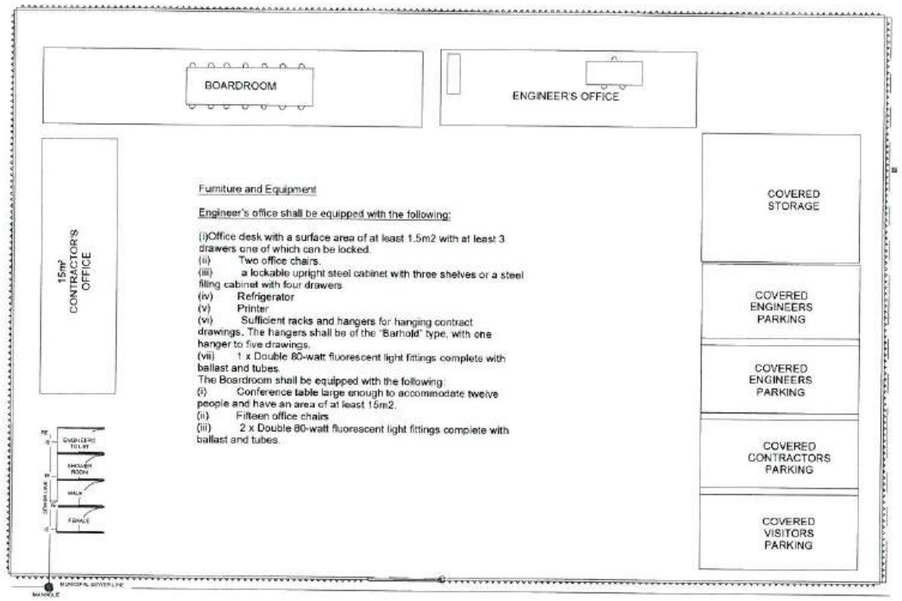
4 North Elevation
1 : 100



5 South Elevation
1 : 100



6 West Elevation
1 : 100



Furniture and Equipment

Engineer's office shall be equipped with the following:

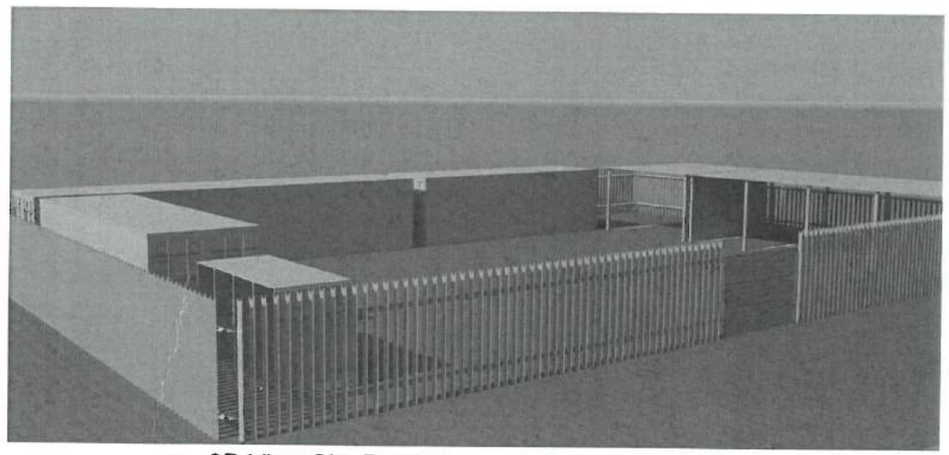
(i)Office desk with a surface area of at least 1.5m2 with at least 3 drawers one of which can be locked.
(ii) Two office chairs.
(iii) a lockable upright steel cabinet with three shelves or a steel filing cabinet with four drawers
(iv) Refrigerator
(v) Printer
(vi) Sufficient racks and hangers for hanging contract drawings. The hangers shall be of the "Barhold" type, with one hanger to five drawings.
(vii) 1 x Double 80-watt fluorescent light fittings complete with ballast and tubes.

The Boardroom shall be equipped with the following:
(i) Conference table large enough to accommodate twelve people and have an area of at least 15m2.
(ii) Fifteen office chairs
(iii) 2 x Double 80-watt fluorescent light fittings complete with ballast and tubes.

7 PROPOSED LAYOUT
1 : 100

SCHEDULE OF AREAS

Dimensions	Boardroom	Engineer's Office
Minimum floor area	28m²	15m²
Minimum window area	4.0m²	3.0m²
Minimum window area opening	2.4m²	1.5m²
Minimum clear height	2.5m	2.5m



2 3D View Site Render
1 : 1

GENERAL NOTES

CONSULTING ENGINEERS
CAPEX DESIGN SECTION
SWISS HOUSE
7TH FLOOR

DESIGNED BY:	T. Mpandaguta	Date:
DRAWN BY:	K. Kolberg	Date:
CHECKED BY:	T. Mpandaguta	Date: 19/2/19
	Signature:	
	ECSA REG. No: 20137881	
APPROVED BY:	F. Chakana	Date:
	Signature:	
	ECSA REG. No: 20110150	

Johannesburg Water

17 HARRISON STREET
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2107

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STANDARD DETAIL FOR
SITE CAMP

SCALE: AS SHOWN

REVISON	DESCRIPTION	DATE

DRAWING No.JW 100-DET01-SC01

PROJECT No. # | DISCIPLINE # | REVISION #

SHEET # OF #

ORIGINAL PAGE SIZE