public works
& infrastructure

Department:
Public Works and Infrastructure
REPUBLIC OF SOUTH AFRICA

TENDER NUMBER: H23/022AI

REFERENCE NUMBER: H23/022AI

PAFURI LAND PORT OF ENTRY (LPOE): SUPPLY AND INSTALLATION OF SOLAR PANEL AND WASTE WATER FACILITY

VOLUME 3

CONTRACT

public works
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Department:
Public Works and Infrastructure
REPUBLIC OF SOUTH AFRICA

VOLUME 3

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C1 AGREEMENT AND CONTRACT DATA

DPW-05: (EC) CONTRACT DATA - GCC 2015: 3RD EDITION

Project title:	***PAFURI LAND PORT OF ENTRY (LPOE): SUPPLY AND INSTALLATION OF SOLAR PANEL AND WASTE WATER FACILITY***				
Tender no:	*H23/022AI*	**WCS no:**	*052476*	**Reference no**:	*H23/022AI*

	The Conditions of Contract applicable to this Contract are clauses 1 to 10 and contract price adjustment schedule of the GENERAL CONDITIONS OF CONTRACT FOR CONSTRUCTION WORKS, THIRD EDITION (2015) prepared by The South African Institution of Civil Engineering Private Bag X200, Halfway House, 1685. **Contractors are cautioned to read the GCC Third Edition (2015) and Contract Data [DPW-05 (EC)] together as some clauses in the GCC Third Edition (2015) have been amended in the Contract Data [DPW-05 (EC)]** **Specific data, which together with these General Conditions of Contract, collectively describe the risks, liabilities and obligations of the contracting Parties and the procedures for the administration of the Contract. Clauses as amended in the Contract Data amends or replaces the corresponding clauses in the GCC Third Edition (2015).** Copies of these conditions of contract may be obtained through *www.saice.org.za*.

	CONTRACT VARIABLES **THE SCHEDULE (Contract Data [1.1.1.8])** The **schedule** is the listed variables in this agreement and contains all variables referred to in this document including specific changes made to **GCC Third Edition (2015)** documentation. It is divided into part 1: contract data completed by the **employer** and part 2: contract data completed by the **contractor**. Part 1 must be completed in full and included in the tender documents. Both the part 1 and part 2 form part of this **agreement** **Spaces requiring information must be filled in, shown as 'not applicable' but not left blank.** Where choices are offered, the non-applicable items are to be deleted. Where insufficient space is provided the information should be annexed hereto and cross referenced to the applicable clause of the **schedule**. Key cross reference clauses are italicised in *[ ]* brackets

PART 1: CONTRACT DATA COMPLETED BY THE EMPLOYER:

A PROJECT INFORMATION

A 1.0 **Works** [1.1.1.35]

Works description	Refer to document ***PG01.1 (EC) – Scope of Works*** for detailed description
Installation of a solar system and related civil works	

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A 2.0 Site [1.1.1.29]

Erf / stand number	N/A
Site address	Pafuri Land Port of Entry
Township / Suburb	Kruger National Park
City / Town	Musina District
Province	Limpopo
Local authority	Musina
GPS Coordinates	22°23'59,15"S 31°02'28,30" E

A 3.0 EMPLOYER AND ITS REPRESENTATIVE

A 3.1 Employer:

Official Name of Organ of State / Public Sector Body	Government of the Republic of South Africa in its Department of Public Works & Infrastructure		
Business registration number	n/a	VAT number	n/a
E-mail	n/a	Telephone	080 078 2542
Postal address	CGO Building, c/o Bosman and Madiba Streets, Pretoria, 0002		
Physical address	CGO Building, c/o Bosman and Madiba Streets, Pretoria, 0002		

A 3.2 Employer's Representative:

Name	Mr. Goodwill Lukhele	Telephone number	012 406 1124
E-mail	Goodwill.Lukhele@dpw.gov.za	Mobile number	082 957 4451
Postal address	CGO Building, c/o Bosman and Madiba Streets, Pretoria, 0002		
Physical address	CGO Building, c/o Bosman and Madiba Streets, Pretoria, 0002		

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A 4.0	**Employers Agent/s**		
A 4.1	**Principal Agent** [1.1.1.16]	**Discipli**ne	Electrical Engineers

Name	Pienaar & Erwee Engineers (Pty) Ltd		
Legal entity of above	Private Company	Contact person	C.J Lourens
Practice number	2003/012848/07	Telephone number	015 296 3092
Country	South-Africa	Mobile number	082 809 4860
E-mail	admin@pevpbg.co.za		
Postal address	Postnet Suite 52, Private Bag x9676, 0700		
Physical address	3 Neethling Street, Hampton Court, Bendor, Polokwane, 0700		

A 4.2	**Agent** [1.1.1.16]	**Discipline**	Civil Engineers

Name	BMK Group		
Legal entity of above	n/a	Contact person	Munya Rupende
Practice number	n/a	Telephone number	011 234 0321
Country	South- Africa	Mobile number	083 774 3157
E-mail	munya@bmkgroup.co.za		
Postal address	Office F10, 33 Riley Road, Pinewood Office Park, Woodmead, 2191		
Physical address	Office F10, 33 Riley Road, Pinewood Office Park, Woodmead, 2191		

A 4.3	**Agent** [1.1.1.16]	**Discipline**	N/A

Name			
Legal entity of above		Contact person	
Practice number		Telephone number	
Country		Mobile number	
E-mail			
Postal address			
Physical address			

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A 4.4	**Agent** [1.1.1.16]	**Discipli**ne	

Name			
Legal entity of above		Contact person	
Practice number		Telephone number	
Country		Mobile number	
E-mail			
Postal address			
Physical address			

A 4.5	**Agent** [1.1.1.16]	**Discipli**ne	

Name			
Legal entity of above		Contact person	
Practice number		Telephone number	
Country		Mobile number	
E-mail			
Postal address			
Physical address			

A 4.6	**Agent** [1.1.1.16]	**Discipli**ne	

Name			
Legal entity of above		Contact person	
Practice number		Telephone number	
Country		Mobile number	
E-mail			
Postal address			
Physical address			

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A 4.7	**Agent** [1.1.1.16]	**Discipli**ne	

Name			
Legal entity of above		Contact person	
Practice number		Telephone number	
Country		Mobile number	
E-mail			
Postal address			
Physical address			

A 4.8	**Agent** [1.1.1.16]	**Discipli**ne	

Name			
Legal entity of above		Contact person	
Practice number		Telephone number	
Country		Mobile number	
E-mail			
Postal address			
Physical address			

A 4.9	**Agent** [1.1.1.16]	**Discipli**ne	

Name			
Legal entity of above		Contact person	
Practice number		Telephone number	
Country		Mobile number	
E-mail			
Postal address			
Physical address			

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B CONTRACT INFORMATION

B 1.0 Definitions [1.1.1.2]

Bills of quantities: System / Method of measurement	SANS 1200

B 2.0 Law, regulations and notices [1.3.2]

Law applicable to the works [1.3.2]	Law of the Republic of South Africa

B 3.0 Offer and acceptance [1.1.1.20]

Currency applicable to this agreement [1.1.1.20]	South African Rand

B 4.0 Documents [1.1.1.7]

The original signed agreement is to be held by the principal agent [1.1.1.7], if not, indicate by whom	Employer
Number of copies of construction information issued to the contractor at no cost. (3 Copies of all relevant construction documentation – this to includes 1 priced Bills of Quantities and 2 unpriced Bills of Quantities)	3

Documents comprising the agreement	**Page numbers**
GCC GENERAL CONDITIONS OF CONTRACT FOR CONSTRUCTION WORKS, THIRD EDITION (2015)	***1-197***
DPW-05: (EC): GCC 2015: 3RD EDITION	***1-30***
The GCC General Preliminaries for use with the GCC 2015: 3RD EDITION	***1-3***
Contract participation goal documentation as further defined in clause 1.1.1.37 [CD] and B16 [CD]	***129-142***
Drawings as per drawing register issued with the tender	**Additional Booklet**
Specifications issued with the tender	***3-197***
Schedules issued with the tender	***n/a***
Bills of Quantities issued with the tender	***1-51***
Addenda as issued during tender stage, if applicable	As issued

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B 5.0 Employer's agents [3.0]

Authority is delegated to the following agents to issue contract instructions and perform duties for specific aspects of the works [3.0] [3.2.3 [CD]]
Principal Agent

Principal agent's and agents' interest or involvement in the works other than a professional interest
N/A

B 6.0 Insurances [8.6]

Insurances by contractor
NB: Insurances submitted must be issued by either an insurance company duly registered in terms of the Insurance Act [Long-Term Insurance Act, 1998 (Act 52 of 1998) or Short-Term Insurance Act, 1998 (Act 53 of 1998)] or by a bank duly registered in terms of the Banks Act, 1990 (Act 94 of 1990). **Insured amounts to include VAT.**

	The Contract Price [8.6.1.1.1] New Works With a deductible not exceeding 5% of each and every claim [8.6.2]	Contract sum plus 10%	Applicable
Or	The Contract Price [8.6.1.1.1] Works with alterations and additions (reinstatement value of existing structures / works without or including new works) with a deductible not exceeding 5% of each and every claim [8.6.2]	Contract sum plus 10%	Not applicable
Or	The Contract Price [8.6.1.1.1] Works with practical completion in sections with a deductible not exceeding 5% of each and every claim [8.6.2]	Contract sum plus 10%	Applicable
	Plant and materials supplied by the Employer [8.6.1.1.2]	R Eng / PQS to determine value	Not applicable
	Professional fees not included in the Contract Price, payable in respect of the repair or reinstatement of damage to the Works or said movables, plus Escalation thereon (if not included above). Minimum R1m unless other amount indicated. [8.6.1.1.3]	R Eng / PQS to determine value	Not applicable
	Direct contractors [8.6.1.1.2] where applicable, to be included in the contract works insurance	R Eng / PQS to determine value	Not applicable
	Special Risks Insurance issued by Sasria [8.6.1.2]	R Eng / PQS to determine value	Applicable

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Public liability insurance [8.6.1.3]	R 5 000 000	Applicable
Ground support insurance [8.6.1.4]	R Eng / PQS to determine value	Not applicable
Subcontractors insurance [8.6.3] where applicable, if not included in works insurance nor by sub-Contractors	R Eng / PQS to determine value	Applicable
Other insurances [8.6.1.5]		
Free issue where applicable, to be included in the contract works insurance	R Eng / PQS to determine value	Not applicable

Hi Risk Insurance when the project is being executed in a geological area classified as a "High Risk Area" [8.6.8[CD]]	R Eng / PQS to determine value	Applicable
Other insurances: If applicable, description 1:	R Eng / PQS to determine value	Not applicable
Other insurances; If applicable, description 2:	R Eng / PQS to determine value	Not applicable

B 7.0 Obligations of the employer

Existing premises will be in use and occupied [5.4.1 & 5.4.2]	Applicable
If applicable, description: The Pafuri Land Port of Entry will be normally operated.	
Restriction of working hours [5.8]	Applicable
If applicable, description: Working hours to fall within working hours of the Pafuri Land Port of Entry.	
Natural features and known services to be preserved by the contractor [4.7]	Applicable
If applicable, description: No damage to existing services and natural features will be allowed.	
Restrictions to the site or areas that the contractor may not occupy [5.4.1 & 5.4.2]	Applicable
If applicable, description: As indicated by client on standard.	

Supply of free issue of material and goods [8.6.1.1.2]	Amount	R	Not applicable
If applicable, description:			

B 8.0 Subcontractors [4.4]

Applicable	If applicable, description of specialisation

Specialisation 1	Solar installation
Specialisation 2	Diesel Generator Contractor
Specialisation 3	N/A
Specialisation 4	N/A
Specialisation 5	N/A

B 9.0 Description of different portions of the works, if applicable [5.14.7, B10.3 [CD]]

Applicable	If applicable, description of sections
Section 1	Solar Installation
Section 2	Relocation of diesel generators
Section 3	Building works
Section 4	Wet Services
Section 5	N/A
Section 6	N/A
Remainder of the works. N/A	

B 10.0 Contract period [B18: 1.2]**, Construction period** [B18: 1.1], **Possession of site** [5.4.1]**, Practical Completion** [1.1.1.14, 5.14.1], **Completion** (Final Approval Certificate) [5.16.1] **and Penalties** [5.13]

B 10.1 Contract Period

Contract period: Period in **months** as indicated**,** include the time from the date of award (commencement date [5.2.1]) for submitting contractual obligatory documents, submission of Health & Safety Plan and approval, period for obtaining the Construction Permit (if applicable), the Construction Period and the Defect Liability Period up to and including Final Completion

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The contract period is determined as follows (Period/s indicated in months):	
Period to submit contractual obligatory documents including submission and approval of health and safety plan by the appointed Health & Safety Agent	1
Period to obtain Construction Permit from Department of Labour upon approval of the Health & Safety Plan by the appointed Health & Safety Agent	1
Total construction period for the Works as a whole from date of Access to and Possession of the Site up to and including **Practical Completion,** as indicated below [1.1.1.14, 5.4.1, 5.14.1]	11
Period to achieve **Completion** [5.14.4]	1
Defect liability period up to and including issuing Final Approval Certificate in months [5.16.1]	12

Total Contract Period	12

B10.2 Construction Period for completion of the Works as a whole

Construction period [B18: 1.2] and **Practical Completion for the Works as a whole** [5.14.1] The time for achieving Practical Completion of the whole of the Works is **measured from the** date of Access to and Possession of the **site** (5.4.1) by the **contractor** inclusive of all **public holidays, special non-working days and builders' holiday shut down periods.**	**Applicable**
The date for practical completion for the works as a whole shall be the period in **months** as indicated, starting from the date of Access to and Possession of the site by the contractor inclusive of all special non-working days and builders' holiday shut down periods [1.1.1.14, 5.4.1, 5.14.1]	12
Notification period for inspection in **working days** by the principal agent.	5
Penalty amount per calendar day for late submission of contractual obligatory documents: Ten percent (10%) of the penalty amount per calendar day for late Practical Completion, excluding VAT. [5.13]	R 1 140.00
Penalty amount per calendar day for **late Practical Completion**, excluding VAT. [5.13].	R 11 400.00
Penalty amount per calendar day for **late Completion** [5.14.4, 5.13]: Thirty percent (30%) of penalty amount per calendar day for late Practical Completion, excluding VAT.	R 3 420.00
Penalty amount per calendar day for **late Final Completion** (Issuing of Final Approval Certificate) [5.16, 5.13]: Fifteen percent (15%) of penalty amount per calendar day for late Practical Completion, excluding VAT.	R 1 710.00

B10.3 Construction Period for completion of the Works in portions

Construction period and **Practical completion for portions of the Works** [5.14.7]					Applicable	
Portions of the Works in sections:	1	2	3	4	5	6
Notification period for inspection by the principal agent in **working days.**	5	5	5	8		
The date for practical completion shall be the period in **months** as indicated from the date of access and possession of the site by the contractor [1.1.1.14, 5.4.1, 5.14.1]	7	8	6	12		
The date for practical completion for **the whole** of the Works, if applicable shall be the period in **months** as indicated from the date of Access to and Possession of the Site by the contractor inclusive of all **public holidays, special non-working days and builders' holiday shut down periods** [5.4.1, 12.2.7; 24.1]					insert construction period as per B12.1 or N/A if Works as a whole is applicable	
Penalty for late Practical Completion, ***if completion in sections is required***, excluding VAT [5.13]						
The penalty amount per day for failing to complete **section 1** of the Works is:					N/A	
The penalty amount per day for failing to complete **section 2** of the Works is:					N/A	

The penalty amount per day for failing to complete **section 3** of the Works is:	N/A
The penalty amount per day for failing to complete **section 4** of the Works is:	N/A
The penalty amount per day for failing to complete **section 5** of the Works is:	N/A
The penalty amount per day for failing to complete **section 6** of the Works is:	N/A
The penalty amount per day for failing to complete **the whole** of the Works, if applicable, is:	N/A
Penalty amount per calendar day for late submission of contractual obligatory documents: To be calculated at Ten percent (10%) of penalty / calendar day to complete the whole of the Works as indicated above, excluding VAT.	
Penalty amount per calendar day for **late Completion** [5.14.4, 5.13]: To be calculated at Thirty percent (30%) of penalty / calendar day to complete **Select** , excluding VAT	
Penalty amount per calendar day for **late Final Completion** (Issuing of Final Approval Certificate) [5.16, 5.13]: To be calculated at Fifteen percent (15%) of penalty / calendar day to complete **Select** , excluding VAT	

B 11.0 Criteria to achieve Practical Completion [1.1.1.14, 5.14.1]

Criteria to achieve Practical Completion not covered in the definition of practical completion	
13.1	Obtain Occupation Certificate from the relevant authority prior to issuing the Practical Completion certificate
13.2	All relevant CoCs
13.3	All guarantees

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13.4	Training on electrical, security and mechanical installations if contractually required
13.5	Maintenance / operating manuals
13.6	CPG and cidb BUILD programme achievement certificates submitted with substatiating documentation
13.7	
13.8	
13.9	
13.10	

B 12.0 Defects liability period [5.16]

Defects liability period: Refer B10.1

Select	If applicable, description of applicable elements

14.1	All civil works (e.g. roads, storm water system, paving, sewer and water lines, etc.)
14.2	Mechanical equipment (e.g. pumps including switchgear, etc.)
14.3	Landscaping including automated systems (irrigation)
14.4	Electrical equipment (e.g. emergency generators, electronic switchgear,etc..)
14.5	Security system/s (e.g. Access control, Intruder alarm, etc.)
14.6	Air conditioning system and plant
14.7	
14.8	
14.9	
14.10	

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B 13.0 Payment [6.10]

Date of month for issue of regular payment certificates Refer [6.10.1]	
Contract price adjustment / cost fluctuations [6.8.2]	Not Applicable
If yes, method to calculate [6.8.2 [CD]]	Contract price adjustment factor
Employer shall pay the contractor within: Refer [6.10.4 [CD]]	Thirty (30) calendar days

B 14.0 Dispute resolution [10.5 [CD]]

Mediation	YES
Name of nominating body	Association of Arbitrators (Southern Africa)
Appointment of Mediator	State Attorney
Litigation	Court with Jurisdiction

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B 15.0 SPECIFIC CHANGES MADE TO GCC 2015: 3RD EDITION

CONTRACT SPECIFIC DATA	
The following contract specific data, referring to the General Conditions of Contract for Construction Works, Third Edition (2015) are applicable to this Contract:	
CLAUSES	**COMPULSORY DATA**
1.1.1.8	Amend Clause 1.1.1.8 to include the word “rights” to read as follows:

	"Contract Data" means the specific data which, together with these General Conditions of Contract, collectively describe the rights, risks, liabilities and obligations of the contracting parties and the procedures for the administration of the Contract.
1.1.1.9	Add to Clause 1.1.1.9 the following: "If the Contractor constitutes under the Law of the Republic of South Africa (B2.0) a joint venture, consortium or other unincorporated grouping of two or more persons: (a) these persons shall be deemed to be jointly and severally liable to the Employer for the performance of the Contract; (b) these persons shall notify the Employer of their leader who shall have authority to bind the Contractor and each of these persons; and (c) the Contractor shall not alter its composition or legal status without the prior consent of the Employer."
1.1.1.13	Amend Clause 1.1.1.13 as follows: "Defects Liability Period" means the period stated in the Contract Data, commencing on the date indicated on the Certificate of Completion for the works as a whole or Certificates of Completion in the event of more than one Certificate of Completion is issued for different parts of the Works, during which the Contractor has both the right and the obligation to make good defects in the materials, Plant and workmanship covered by the Contract. Defects Liability Period is: **12 months**. The Defects Liability Period for the works shall commence on the calendar day following the date of the Certificate of Completion for the works as a whole or Certificates of Completion in the event of more than one Certificate of Completion is issued for different parts of the Works and end at midnight (00:00) three hundred and sixty five days (365) calendar days from the date of the Certificate of Completion.
1.1.1.14	Amend Clause 1.1.1.14 as follows: "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 of Access to and Possession of Site date (5.4.1) and as adjusted by such extensions of time or acceleration as may be allowed in terms of Contract (5.12).
1.1.1.15	The name of the Employer: Refer to A 3.1 [CD]
1.1.1.16	The name of the Employer's Representative: Refer to A 3.2 [CD]
1.1.1.17	The name of the Employer's Agent: Refer to A 4.0 and B 5.0 [CD]

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1.1.1.20	Amend Clause 1.1.1.20 by inserting the following words at the end of this definition: "If the Acceptance section of the Form or Offer and Acceptance" contains conditional statements or a schedule of deviations is attached to the Form of Offer and Acceptance, then Form of Offer and Acceptance means the Contract Agreement, that shall be substantially in accordance with the form attached to the Scope of Works, and the date of signing the Contract Agreement shall be the date of the Form of Offer and Acceptance"

1.1.1.21.A	**Add new Clause 1.1.1.21.A** The interest rates applicable on this contract, whether specifically indicated in the relevant clauses or not, will be the rate as determined by the Minister of Finance from time to time, in terms of section 80(1)(b) of the Public Finance Management Act, 1999 (Act No 1 of 1999) as amended, calculated as simple interest, in respect of debts owing to the State, and will be the rate as published by the Minister of Justice and Correctional Services from time to time, in terms of section 1(2) of the Prescribed Rate of Interest Act, 1975 (Act No 55 of 1975) as amended, calculated as simple interest, in respect of debts owing by the State.
1.1.1.27	This Pricing Strategy is a: **Re-measurement Contract**.
1.1.1.31	Not applicable to this Contract.
1.1.1.35	Insert the definition of “Value of Works” as Clause 1.1.1.35: “Value of Works” means the value of the Works certified by the Employer’s Agent as having been satisfactorily executed and shall include the value of the works done, the value of the materials and/or plant and Contract Price Adjustments.
1.1.1.36	Insert the definition of “Latent and Patent Defects” as Clause 1.1.1.36: A 'latent defect' is a material defect, which was not visible after 'reasonable' inspection. The latent defect period commences at the date of Final Approval Certificate and ends 5 years [after that date [5.16.3]. A patent defect is a flaw that is not hidden and ought to be easily identified upon reasonable inspection.
1.1.1.37	**Add new Clause 1.1.1.37** Contract participation goals applicable to this Contract are as indicated in B16 [D] and described in the following tender documents: DPW 03 (EC): TENDER DATA, PG 01.1 (EC) SCOPE OF WORK and PG 02.1 (EC) PRICING ASSUMPTIONS.
1.2.3.	Replace Clause 1.2.3. with the following: The Employer’s Agent is as indicated in clause B 5.0 and shall have the authority to act on behalf of the employer as indicated in the contract document read with the contract data. [3.2.3].
1.2.6	**Add new Clause 1.2.6** The priority of the documents shall be in accordance with the following sequence: (a) The Form of Offer and Acceptance and the signed Schedule of Devia7ons, (b) Contract Data, (c) These General Conditions of Contract, (e) Scope of Work, and (f) Pricing Data
1.3.4	Not applicable to this Contract.

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1.3.5	Replace Clause 1.3.5 with the following: (a) The Employer will become the owner of the information, documents, advice, recommendation and reports collected, furnished and/or compiled by the Contractor during the course of, and for the purposes of executing this Contract, all of which will be handed over to the Employer on request during the contract, but in any event on completion of contract, the termination and/or cancellation of this Contract for whatever reason. The

	Contractor relinquishes its lien / retention or any other rights thereon to which it may be entitled. (b) The copyright of all documents, recommendations and reports compiled by the Contractor during the course of and for the purposes of finalizing the Works will vest in the Employer, and may not be reproduced or distributed or made available to any person outside the Employer's service, or to any institution in any way, without the prior written consent of the Employer. The Employer shall have the right to use such material for any other purpose without the approval of information or payment to the Contractor. (c) The copyright of all electronic aids, software programmes etc. prepared or developed in terms of the Contract shall vest in the Employer, who shall have the right to use such material for any other purpose without the approval of, information or payment to the Contractor. (d) In case of the Contractor providing documents, electronic aids, software programs or like material to the Employer, the development of which has not been at the expense of the Employer, copyright shall not vest in the Employer. The Contractor shall be required to indicate to which documents, electronic aids, software programs or like material this provision applies. (e) The Contractor hereby indemnifies the Employer against any action, claim, damages or legal cost that may be instituted against the Employer on the grounds of an alleged infringement of any copyright, patents or any other intellectual property right in connection with the Works outlined in this Contract. (f) All information, documents, recommendations, programs and reports collected or compiled must be regarded as confidential and may not be communicated or made available to any person outside the Employer's service and may not be published either during the currency of this Contract or after termination thereof without the prior written consent of the Employer.
1.3.7	Replace Clause 1.3.7 with the following By entering into this contract, the Contractor waives any lien that he may have or acquire, notwithstanding any other condition/s in this contract.
3.2.3	Add to Clause 3.2.3 the following: 1. The Employer's Principal Agent's authority to act and/or to execute functions or duties or to issue instructions are expressly **excluded** in respect of the following, unless same has been approved by the employer: (a) Appointment of Subcontractors – clause 4.4.4; (b) Granting of an extension of time and/or ruling on claims associated with claims for extension of time – clauses 5.12, 10.1.5; (c) Acceleration of the rate of progress and determination of the cost for payment of such acceleration – clause 5.12.4; (c) Rulings on claims and disputes – clauses 10.1.5, 10.2.3 and 10.3.3; (d) Suspension of the Works – clause 5.11.2; (e) Final Payment Certificate – clause 6.10.9;

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	(f) Issuing of *mora* notices to the Contractor – clauses 9.1.1, 9.1.2.1 and 9.2.1; (g) Cancellation of the contract between the Employer and Contractor – clauses 9.1.1, 9.1.2.1 and 9.2.1. (h) Any variation orders – clause 6.3.1

	2. In order to be legally binding and have legal bearing and consequence, any ruling in respect of the above matters (a) to (h) must be on an official document, signed and issued by the Employer to the Contractor. 3. The Contractor must submit claims, demands, notices, notifications, updated particulars and reports in writing, as well as any other supporting documentation pertaining thereto, in respect of any of the above listed matters (a) to (h), to the Employer's Agent within the time periods and in the format(s) as determined in the relevant clauses of the Conditions of Contract. Failing to deliver such to the Employer's Agent and in the correct format will invalidate any claim and the consequences of such failure will *mutatis mutandis* be as stated in clause 10.1.4. 4. Clauses 6.10.9 and 10.1.5 shall be amended as follows to indicate the limitation on the Employer's Agent authority in respect thereof: **Clause 6.10.9 – Amend to read as follows:** Within 14 days of the date of final approval as stated in the Final Approval Certificate, the Contractor shall deliver to the Employer's Agent a final statement claiming final settlement of all moneys due to him (save in respect of matters in dispute, in terms of Clauses 10.3 to 10.11, and not yet resolved). The Employer's Agent shall within 14 days issue to the Contractor a Final Payment Certificate the amount of which shall be paid to the Contractor within 30 days of the date of such certificate, after which no further payments shall be due to the Contractor (save in respect of matters in dispute, in terms of Clauses 10.3 to 10.11 and not yet resolved). **Clause 10.1.5 – Amend to read as follows:** Unless otherwise provided in the Contract, the Employer shall, within 28 days after the Contractor has delivered his claim in terms of Clause 10.1.1 as read with Clause 10.1.2, deliver to the Contractor his written and adequately reasoned ruling on the claim (referring specifically to this Clause). The amount thereof, if any, allowed by the Employer shall be included to the credit of the Contractor in the next payment certificate. If no ruling has been made within the 28 days, as referred to in clause 10.1.5. or any extension thereof as agreed to by the parties, the claim shall be regarded as rejected by the Employer. 5. Insert the following under 3.2.3: Provided that, notwithstanding any provisions to the contrary in the Contract, the Employer shall have the right to reverse and, should it deem it necessary, to amend any certificate, instruction, decision or valuation of the Employer's Agent and to issue a new one, and such certificate instruction, decisions or valuations shall for the purposes of the Contract be deemed to be issued by the Employer's Agent, provided that the Contractor shall be remunerated in the normal manner for work executed in good faith in terms of an instruction issued by the Employer's Agent and which has subsequently been rescinded.
3.3.2.1	Amend Clause 3.3.2.1 to insert the word "plant" to read as follows: Observe how the Works are carried out, examine and test materials, plant and workmanship, and receive from the Contractor such information as he shall reasonably require.

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3.3.2.2.3	Add to Clause 3.3.2.2.3 the following: All oral communication must be reduced into writing to be binding on the parties.
3.3.2.2.4	Add to Clause 3.3.2.2.4 the following: All oral communication must be reduced into writing to be binding on the parties.
3.3.3.2	Amend Clause 3.3.3.2 to insert the word "plant" to reads as follows: Notwithstanding any authority assigned to him in terms of Clauses 3.3.2 and 3.3.4, failure by the ~~E~~ Employer's Agent's Representative to disapprove of any work, workmanship, plant or materials

	shall not prejudice the power of the Employer's Agent's thereafter to disapprove thereof and exercise any of his powers in terms of the Contract in respect of thereof.
4.4.4	Ref Clause 3.2.3.
4.4.6	Not applicable to this Contract.
4.8.2.1	Amend Clause 4.8.2.1 to include the word "person", as follows: Makes available to the Employer, or to any such contractor, person or authority, any roads or ways for the maintenance of which the Contractor is responsible, or
4.8.2.2	Amend Clause 4.8.2.2 to include "Employer" and "contractors", as follows: Provides any other facility or service of whatsoever nature to the Employer or to any of the said contractors, persons or authorities,
4.12.3	Add to Clause 4.12.3 the following: All oral communication must be reduced into writing to be binding on the parties.
5.3.1	Add to Clause 5.3.1: The documentation required before commencement with Works execution are: • Health and Safety Plan to be provided within 14 calendar days from award (Ref Clause 4.3) • Initial programme to be provided within 21 calendar days of handing over the site to the contractor (Clause 5.6) • Security (C1.0, Clause 6.2) • Insurance/s (B6, Clause 8.6) • *insert other requirements* • insert other requirements • insert other requirements
5.3.2	Add to Clause 5.3.2: The time to submit the documentation required before commencement with Works execution is: **21 calendar days.**
5.4.2	Add to Clause 5.4.2: The access to, and possession of, the Site referred to in Clause 5.4.1 shall be ***enter "exclusive" or "not exlcusive"*** to the Contractor. In the event of access to, and possession of, the Site is not exclusive to the Contractor, the following limitations apply: Insert an exposition of limitation or refer to separate attachement in specifications

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5.6.2.2	Replace Clause 5.6.2.2 with the following: The sequence, timing of activities and resources for carrying out the Works.
5.6.2.7	Add the following to Clause 5.6.2.7: Updated cash flows and construction programme/s to be submitted on a monthly basis to the Employer's Agent and the Employer.

5.8.1	Add the following to Clause 5.8.1: The non-working days are: **Saturdays and Sundays** The special non-working days are: **Public Holidays and the year-end break annually published by the BCCEI (Bargaining Council for the Civil Engineering Industry)**
5.9.1	Amend Clause 5.9.1 as follows: On the Commencement Date, the Engineer shall deliver to the Contractor three (3) copies, at no cost to the Contractor, of the drawings and any instructions required for the commencement of the Works. The cost of any additional copies of such drawings and/or instructions, as may be required by the Contractor, will be for the account of the Contractor.
5.11.2	Ref Clause 3.2.3
5.12	Ref Clause 3.2.3
5.12.2.2	Amend Clause 5.12.2.2 as following: "Abnormal climatic conditions, therefore any weather conditions i.e. rain, wind (speed or dust), snow, frost, temperature (cold or heat) that have an adverse effect on the progress of the Works and during which no work is possible on site."
5.13.1	Add the following to Clause 5.13.1: The penalty for failing to complete the Works: Refer to B10 CD
5.14.1	Amend the second paragraph of Clause 5.14.1 as follows: When the Works are about to reach the said stage, the Contractor shall, in writing, request a Certificate of Practical Completion and the Employer's Agent shall, within 14 days after receiving such request, issue to the Contractor a written list setting out the work to be completed to justify Practical Completion. Should the Employer's Agent not issue such a list within the 14 days, the Contractor shall notify the Employer accordingly. Should the Employer not issue such a list within 7 days of receipt of such notice, Practical Completion shall be deemed to have been achieved on the 14th day after the contractor requested the Certificate of Practical Completion.
5.14.4	Add the following to Clause 5.14.4: Penalty for late Completion will be 30% of penalty applicable to late Practical Completion / calendar day. Penalty for late Final Completion will be 15% of penalty applicable to late Practical Completion / calendar day.
5.16.1	Amend Clause 5.16.1 by deleting the provision in the third paragraph of this clause.

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5.16.2	Amend Clause 5.16.2 as follows: No certificate other than the Final Approval Certificate referred to in Clause 5.16.1 shall be deemed to constitute approval of the Works or shall be taken as an admission of the due performance of the Contract or any part thereof, nor of the accuracy of any claim made by the Contractor, nor shall any other certificate exclude or prejudice any of the powers of the Employer's Agent and/or the Employer.
5.16.3	The latent defect period for all works is: **5 years**
6.2.1	The type of security for the due performance of the Contract, as selected by the Contractor in the Contract Data, must be delivered to the Employer.

6.2.3	Amend Clause 6.2.3 as follows: If the Contractor has selected a performance guarantee as security, he shall ensure that it remains valid and enforceable as required in terms of the Contract.
6.3.1	Amend first paragraph to Clause 6.3.1 as follows: If, at any time before the issue of the **Practical Completion**, the Employer's Agent shall require any variation of the form, quality or quantity of the Works or any part thereof provided that such Variation Order shall not substantially alter the Scope of Work, he shall have power to order the Contractor to do any of the following subject to obtaining approval from the Employer (3.2.3):
6.5.1.2.3	The percentage allowance to cover overhead charges is **33%,** except on material cost where the percentage allowance is **10%.**
6.8.2	When Contract Price Adjustment is applicable [B13] the value of payment certificates is to be adjusted by a Contract Price Adjustment Factor (CPAF): The value of the certificates issued shall be adjusted in accordance with the Contract Price Adjustment Factor with the following values: The value of "x" is 0.15. The values of the coefficients are: a = 0.25. (Labour) b = 0.3 (Contractor's equipment) c = 0.3 (Material) d = 0.15 (Fuel) The values of the coefficients for "Repair and Maintenance Project" (RAMP) contracts are: a = 0.35 (Labour) b = 0.20 (Contractor's equipment) c = 0.35 (Material) d = 0.10 (Fuel) The urban area nearest the Site is ***insert name of urban area***. *(Select urban area from Statistical News Release, P0141, Table A)* The applicable industry for the Construction Material Price Index for materials / plant is ***insert name of industry***. *(Select the applicable industry from Statistical News Release, P0151.1, Tables 2,4,5)* The area for the Producer Price Index for fuel is ***insert name of area***. *(Select the area from Statistical News Release, P0142.1, Table 1.)* The base month is ***insert month insert year***. *(The month prior to the closing of the tender.)*

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6.8.3	Price adjustments for variations in the costs of special materials are not allowed.
6.9.1	Replace Clause 6.9.1 with the following: "Plant and materials will only be certified and paid for upon furnishing proof of ownership by the contractor. Once paid, material and goods shall become the property of the Employer and shall not be removed from site without the written authority of the Employers Agent.
6.10.1	Add at end of Clause 6.10.1 The contractor shall provide the Employer's Agent every month, on dates as agreed between parties / instructed by the Principal Agent, with the following information: (a) Monthly Local content report, (b) EPWP / NYS payment register, labour reports and certified ID document of

	EPWP/ NYS beneficiaries, Contract between Contractor and EPWP/ NYS beneficiaries, attendance register. (if applicable) (c) Tax Invoice (d) Labour intensive report (e) Contract participation goal reports (f) Updated construction programme (g) Revised cash flows
6.10.1.5	The percentage advance on materials not yet built into the Permanent Works is: **85 %**.
6.10.3	The limit of retention money is dependent on the security to be provided by the Contractor in terms of Clause 6.2.1.
6.10.4	Replace "28 days" with "30 days" provided all required documents including an invoice have been submitted and are correct in all respects.
6.10.5	Replace Clause 6.10.5 with the following: In respect of contracts up to R2 million and in respect of contracts above R2 million where the Contractor elects a security by means of a 10% retention, 50% of the retention shall be released to the Contractor when the Employer's Agent issues the Certificate of Completion in terms of clause 5.14.4. The remaining 50% of the retention shall be released in accordance with the provisions of the conditions of contract and will become due and payable when the Contractor becomes entitled, in terms of Clause 5.16.1, to receive the Final Approval Certificate. In respect of contracts above R2 million, where the Contractor elects a security by means of a cash deposit or fixed guarantee of 5% of the Contract Sum (excl. VAT) and a 5% retention of the Value of the Works (excl. VAT), the cash deposit or fixed guarantee, whichever is applicable, shall be refunded to the Contractor or return to the guarantor, respectively, when the Employer's Agent issues the Certificate of Completion in terms of Clause 5.14.4. The 5% retention of the Value of the Works (excl. VAT) shall become due and payable when the Contractor becomes entitled, in terms of Clause 5.16.1, to receive the Final Approval Certificate. In respect of contracts above R2 million, where the Contractor elects a security by means of a cash deposit or a variable guarantee of 10% of the Contract Sum (excl. VAT), the cash deposit or the variable guarantee, whichever is applicable, will be reduced to 5% of the Value of the Works (excl. VAT) when the Employer's Agent issues the Certificate of Completion in terms of Clause 5.14.4. The balance of the cash deposit shall become due and payable or the variable guarantee shall expire when the Contractor becomes entitled in terms of Clause 5.16.1 to receive the Final Approval Certificate.

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6.10.6.2	Replace Clause 6.10.6.2 with the following: "In the event of failure by the Employer to make the payment by the due date, he shall pay to the Contractor interest, at the rate as published by the Minister of Justice and Correctional Services from time to time, in terms of section 1(2) of the Prescribed Rate of Interest Act, 1975 (Act No 55 of 1975) as amended, calculated as simple interest, in respect of debts owing by the State". (1.1.1.21.A).
6.10.9	Ref Clause 3.2.3.
7.2.1	The last sentence to read "Failing requirements or instructions, the Plant, workmanship and materials of the respective kinds shall be suitable for the intended purpose provided that materials procured for the works are from South African manufactures and suppliers. Imported materials shall only be considered under exceptional circumstances, based on compelling technical justifications, and subject to the approval by the DPWI. Failing to comply, unless specified or approval granted will result in a ten percent (10%) penalty of the value of imported material used without approval.
7.5.3	Add the following to Clause 7.5.3 "Should the work inspected by the Employer's Agent be rejected, all consultant's fees / costs pertaining to the unsuccessful inspection shall be recovered from the contractor".

7.9.1	Insert the following at the end of Clause 7.9.1: Provided that, should the Contractor on demand not pay the amount of such costs to the Employer, such amount may be determined and deducted by the Employer from any amount due to or that may become due to the Contractor under this or any other previous or subsequent contract between the Contractor and the Employer.
8.2.2.1	Insert the following as a second paragraph to Clause 8.2.2.1: The Contractor shall at all times proceed immediately to remove or dispose of any debris arising from damage to or destruction of the Works and to rebuild, restore, replace and/or repair the Works, failing which the Employer may cause same to be done and recover the reasonable costs associated therewith from the Contractor.
8.3.1.10	Replace Clause 8.3.1.10 with the following: “Ionising, radiation, or contamination by radioactivity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuels, excluding leakages of any radioactive material / gases / corrosive liquids/chemicals, which are harmful to the environment and biological life, brought on to site for installation or used in the Works prior to final approval”.
8.4.3	Add the following as Clause 8.4.3: Where the Contractor has caused damage to property (moveable and immovable), of any person, the Employer or third parties, the Contractor shall on receiving a written instruction from the Employer’s Agent immediately proceed at his own cost to remove or dispose of any debris and to rebuild, restore, replace and/or repair such property and to execute the Works.
8.6.1	Replace Clause 8.6.1 with the following: Except if provided otherwise in the Contract Data, the Contractor, without limiting his obligations in terms of the Contract, shall effect and keep the respective insurances [CD] in force, in favour of the employer as beneficiary, from the date of possession of the site until the issue of the certificate of practical completion and with an extension to cover the contractors obligations after the date of practical completion [8.2.1]
8.6.1.1.1	Ref B6.0 CD for value of insurance.
8.6.1.1.2	Ref B6.0 CD for value of insurance.

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8.6.1.1.3	Ref B6.0 CD for value of insurance.
8.6.1.3	Amend Clause 8.6.1.3 as follows: Liability insurance that covers the Contractor against liability for the death of, or injury to any person, or loss of, or damage to any property (other than property while it is insured in terms of Clause 8.6.1.1) arising from or in the course of the fulfilment of the Contract, from the Commencement Date to the date of the end of the Defects Liability Period, if applicable, or otherwise to the issue of the Certificate of Completion.
8.6.4	Not applicable to this Contract.
8.6.6	Replace Clause 8.6.6 with the following: Without limiting the contractor’s obligations in terms of the contract, the contractor shall, within twenty-one (21) calendar days of the date of letter of acceptance, but before commencement of the works, submit to the employer all the policies by which the insurances are effected and due proof of upfront payment of all premiums thereunder to keep the policies effective from the Commencement Date to the date of the end of the Defects Liability Period, if applicable, or otherwise to the issue of the Certificate of Completion.

8.6.7	Replace Clause 8.6.7 with the following: If the Contractor fails to effect and keep in force any of the insurances referred to in Clause 8.6.1, the Employer may cancel the Contract in terms of Clause 9.2.
8.6.8	**Add new Clause 8.6.8.** **HIGH RISK INSURANCE** In the event of the project being executed in a geological area classified as a "High Risk Area", that is an area which is subject to highly unstable subsurface conditions that might result in catastrophic ground movement evident by sinkhole or doline formation the following will apply: (1) **Damage to the Works** The Contractor shall, from the date of Commencement of the Works until the date of the Certificate of Completion, bear the full risk of and hereby indemnifies and holds harmless the Employer against any damage to and/or destruction of the Works consequent upon a catastrophic ground movement as mentioned above. The Contractor shall take such precautions and security measures and other steps for the protection of the Works as he may deem necessary. When so instructed to do so by the Employer's Agent, the Contractor shall proceed immediately to remove and/or dispose of any debris arising from damage to or destruction of the Works and to rebuild, restore, replace and/or repair the Works, at the Contractor's own costs. (2) **Injury to Persons or Loss of or damage to Properties** The Contractor shall be liable for and hereby indemnifies and holds harmless the Employer against any liability, loss, claim or proceeding arising during the Contract Period whether arising in common law or by Statute, consequent upon personal injuries to or the death of any person whomsoever resulting from, arising out of or caused by a catastrophic ground movement as mentioned above. The Contractor shall be liable for and hereby indemnifies the Employer against any and all liability, loss, claim or proceeding consequent upon loss of or damage to any moveable, or

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	immovable or personal property or property contiguous to the Site, whether belonging to or under the control of the Employer or any other body or person whomsoever arising out of or caused by a catastrophic ground movement, as mentioned above, which occurred during the Contract Period. (3) It is the responsibility of the Contractor to ensure that he has adequate insurance to cover his risk and liability as mentioned in Clauses 8.6.8(1) and 8.6.8 (2) above. Without limiting his obligations in terms of the Contract, the Contractor shall, within 21 days of the Commencement Date and before Commencement of the Works, submit to the Employer proof of such insurance policy, if requested to do so. (4) The Employer shall be entitled to recover any and all losses and/or damages of whatever nature suffered or incurred consequent upon the Contractor's default of his obligations as set out in Clauses 8.6.8 (1), 8.6.8 (2) and 8.6.8 (3). Provided that, should the Contractor on demand not pay the amount of such costs to the Employer, such amount may be determined and deducted by the Employer from any amount due to or that may become due to the Contractor under this or any other existing or subsequent contract between the Contractor and the Employer.
9.1.1	Ref Clause 3.2.3
9.1.2.1	Ref Clause 3.2.3

9.1.4	Replace the first paragraph of Clause 9.1.4 with the following: "In the circumstances referred to in Clauses 9.1.1, 9.1.2 or 9.1.3 (provided that the circumstances in 9.1.3 is not due to the fault of the Contractor, his employees, contractors or agents), and whether or not the Contract is terminated under the provisions of this Clause, the Contractor shall be entitled on proof of payment of any increased cost of or incidental to the execution of the Works which is specifically attributable to, or consequent upon the circumstances defined in Clauses 9.1.1, 9.1.2 or 9.1.3; …….. necessary changes"
9.1.5	Replace the first paragraph of Clause 9.1.5 with the following: If the Contract is terminated on any account in terms of this Clause (provided that the circumstances in 9.1.3 is not due to the fault of the Contractor, his employees, contractors or agents) , the Contractor shall be paid by the Employer (insofar as such amounts or items have not already been covered by payments on account made to the Contractor) for all measured work executed prior to the date of termination, the amount (without retention), payable in terms of the Contract and, in addition: "
9.1.5.5	Not applicable to this Contract.
9.1.6	Not applicable to this Contract.
9.2.1	Ref Clause 3.2.3
9.2.1.3.9	**Add new Clause 9.2.1.3.9:** Has failed to effect and keep in force any of the insurances referred to in Clause 8.6.1.
9.2.4	Add the following as Clause 9.2.4: In the case where a contract is terminated by the Employer by no fault by any party, the contractor shall be entitled to no other compensation than for work done and materials on site as certified by the Principal Agent at the date of termination.

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9.3.2.2	Replace Clause 9.3.2.2 with the following: All Plant and Construction Equipment, Temporary Works and unused materials brought onto the Site by the Contractor, and where ownership has not been transferred to the Employer (see Clause 6.9.1), shall be removed from the Site on termination of the contract by any party.
9.3.2.3	Not applicable to this Contract.
9.3.3	Add the following at the end of Clause 9.3.3 After cancellation of the Contract by the Contractor, the Contractor, when requested by the Employer to do so, shall not be entitled to refuse to withdraw from the Works on the grounds of any lien or a right of retention or on the grounds of any other right whatsoever. Nothing in this Clause shall prejudice the right of the Contractor to exercise, either in lieu of or in addition to the Contractor rights and remedies specified in this Clause, any other rights or remedies to which the Contractor may be entitled under the Contract or common law.
10.1.3.1	Replace Clause 10.1.3.1 with the following: All facts and circumstances relating to the claims shall be investigated as and when they occur or arise. For this purpose, the Contractor shall deliver to the Employer's Agent, records in a form approved by the Employer's Agent, of all the facts and circumstances which the Contractor considers relevant and wishes to rely upon in support of his claims, including details of all construction equipment, plant, labour, and materials relevant to each claim. Such records shall be submitted promptly after the occurrence of the event giving rise to the claim.

10.1.3.6	Replace Clause 10.1.3.6 with the following: The Employer, the Employer's Agent and the Contractor shall in any proceedings in accordance with Clauses 10.3 and 10.11 be entitled to give or lead evidence of or rely on any fact or circumstance not recorded in terms of this Clause, if other party to the dispute is prejudiced by such non-recording of the facts.
10.1.4	Ref Clause 3.2.3.
10.1.5	Ref Clause 3.2.3.
10.1.6	**Add new Clause 10.1.6:** If the Employer fails to give his ruling within the period referred to in Clause 10.1.5 he shall be deemed to have given a ruling dismissing the claim.
10.1.3.6	Replace Clause 10.1.3.6 with the following: The employer, the Employer's Agent and the Contractor shall in any proceedings in accordance with Clauses 10.3 and 10.11 be entitled to give or lead evidence oof or rely on any fact or circumstance not recorded in terms of the Clause, if the other party to the dispute in prejudiced by such nor-recording of the facts.
10.2.1	Replace Clause 10.2.1 with the following: In respect of any matter arising out of or in connection with the Contract, which is not required to be dealt with in terms of Clause 10.1 or which does not require the decision or ruling of the Employer, the Contractor or the Employer shall have the right to deliver a written dissatisfaction claim to the Employer's Agent. This written claim shall be supported by particulars and substantiated.

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10.2.2	Replace Clause 10.2.2 with the following: If, in respect of any matter arising out of or in connection with the Contract, which is not required to be dealt with in terms of Clause 10.1 or which does not require the decision or ruling of the Employer, the Contractor or the Employer fails to submit a claim within 28 days after the cause of dissatisfaction, he shall have no further right to raise any dissatisfaction on such matter.
10.2.3	Ref clause 3.2.3.
10.3.2	Replace Clause 10.3.2 with the following: If either party shall have given notice in compliance with Clause 10.3.1, the dispute shall be referred immediately to mediation under Clause 10.5, unless amicable settlement is contemplated.
10.3.3	Replace Clause 10.3.3with the following:: In respect of a ruling given by the Employer (Ref clause 3.2.3), and although the parties may have delivered a Dispute Notice, the ruling shall be in full force and carried into effect unless and until otherwise agreed by both parties, or in terms of a mediation decision or court judgement.
10.4.2	Replace Clause 10.4.2 with the following: If the other party rejects the invitation to amicable settlement in writing, or does not respond in writing to the invitation within 14 days, or amicable settlement is unsuccessful, referral to mediation shall follow immediately. Should mediation be unsuccessful, the dispute shall be resolved by Litigation.
10.4.4	Replace Clause 10.4.4 with the following:

	Save for reference to any portion of any settlement, or decision which has been agreed to be final and binding on the parties, no reference shall be made by or on behalf of either party in any subsequent court proceedings, to any outcome of an amicable settlement, or to the fact that any particular evidence was given, or to any submission, statement or admission made in the course of the amicable settlement.
10.5	Replace Clause 10.5 with the following: The parties may, by agreement and at any time before Litigation, refer a dispute to mediation, in which event: 10.5.1 The appointment of a mediator, the procedure, and the status of the outcome shall be agreed between the parties. 10.5.2 Regardless of the outcome of a mediation the parties shall bear their own costs concerning the Mediation and equally share the costs of the mediator and related expenses.
10.6	Not applicable to this Contract.
10.7	Not applicable to this Contract.
10.10.3	Replace Clause 10.10.3 with the following: The court shall have full power to open up, review and revise any ruling, decision, order, instruction, certificate or valuation of the Employer's Agent and Employer and neither party shall be limited in such proceedings before such court to the evidence or arguments put before the Employer's Agent or Employer for the purpose of obtaining his ruling.

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B 16.0 CONTRACT PARTICIPATION GOAL TARGETS AND CIDB B.U.I.L.D. PROGRAMME

The contractor shall achieve in the performance of the contract the following Contract Participation Goals (CPGs) as described in PG-01.2 (EC): Scope of Work and PG-02.2 (EC): Pricing Assumptions and in accordance with the feasibility study, which forms part of the specifications in the CPG Section of the Specification of this contract.

(a)	Minimum Targeted Local Manufacturers of Material Contract Participation Goal, in accordance with the cidb Standard for Contract Participation Goals for Targeting Enterprises and Labour through Construction Works Contracts as published in the Government Gazette Notice No. 41237 of 10 November 2017, as amended in cidb Best Practice Project Assessment Scheme Notice No. 43726 of 18 September 2020 – Condition of Contract.	***Select***
(b)	Minimum Targeted Local Building Material Suppliers Contract Participation Goal in accordance with the cidb Standard for Contract Participation Goals for Targeting Enterprises and Labour through Construction Works Contracts as published in the Government Gazette Notice No. 41237 of 10 November 2017, as amended in cidb Best Practice Project Assessment Scheme Notice No. 43726 of 18 September 2020 – Condition of Contract.	***Select***
(c)	Minimum Targeted Local Labour Skills Development Contract Participation Goal in accordance with the cidb Standard for Contract Participation Goals for Targeting Enterprises and Labour through Construction Works Contracts as published in the Government Gazette Notice No. 41237 of 10 November 2017, as amended in cidb Best Practice Project Assessment Scheme Notice No. 43726 of 18 September 2020 – Condition of Contract.	***Select***

(d)	**cidb BUILD Programme:** Minimum Targeted Enterprise Development Contract Participation Goal in accordance with the cidb Standard for Indirect Targeting for Enterprise Development through Construction Works Contracts, No 36190 Government Gazette, 25 February 2013, as amended in cidb Best Practice Project Assessment Scheme Notice No. 43726 of 18 September 2020 – Condition of Contract.	***Select***
(e)	**cidb BUILD Programme:** Minimum Targeted Contract Skills Development Goal in accordance with the cidb Standard for Developing Skills through Infrastructure Contracts as published in the Government Gazette Notice No. 48491 of 28 April 2023. and the cidb Best Practice Project Assessment Scheme Notice No. 43726 of 18 September 2020 – Condition of Contract.	***Select***
(f)	DPWI National Youth Service training and development programme (NYS) – Condition of Contract.	***Select***
(g)	Labour Intensive Works – Condition of Contract.	***Select***
(h)		***Select***
(i)		***Select***

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PART 2: CONTRACT DATA COMPLETED BY THE TENDERER:

C TENDERER'S SELECTIONS

C 1.0 Securities [11.0]

In respect of contracts with a contract sum up to R1 million, the security to be provided by the contractor to the employer will be a payment reduction of five per cent (5%) of the value certified in the payment certificate (excluding VAT).

In respect of contracts with a contract sum more than R1 million, the security to be provided by the contractor to the employer will be selected by the Contractor as indicated below:

Guarantee for construction: Select Option A, B, C, D or E

Option A	cash deposit of 10 % of the contract sum (excluding VAT)
Option B	variable construction guarantee of 10 % of the contract sum (excluding VAT) (DPW-10.3 EC)
Option C	payment reduction of 10% of the value certified in the payment certificate (excluding VAT)
Option D	cash deposit of 5% of the contract sum (excluding. VAT) and a payment reduction of 5% of the value certified in the payment certificate (excluding. VAT)
Option E	fixed construction guarantee of 5% of the contract sum (excluding VAT) and a payment reduction of 5% of the value certified in the payment certificate (excluding VAT) (DPW-10.1 EC)]

NB: Insurances submitted must be issued by either an insurance company duly registered in terms of the Insurance Act [Long-Term Insurance Act, 1998 (Act 52 of 1998) or Short-Term Insurance Act, 1998 (Act 53 of 1998)] or by a bank duly registered in terms of the Banks Act, 1990 (Act 94 of 1990) on the pro-forma referred to above. No alterations or amendments of the wording of the pro-forma will be accepted.

Guarantee for payment by **employer** [11.5.1; 11.10]	Not applicable
Advance payment, subject to a **guarantee for advance payment** [11.2.2; 11.3]	Not applicable

Tender / Quotation no: H23/022AI

C 2.0 Payment of preliminaries [25.0]

Contractor's selection

Select Option A or B

Where the **contractor** does not select an option, Option A shall apply

Payment methods

Option A	The **preliminaries** shall be paid in accordance with an amount prorated to the value of the **works** executed in the same ratio as the amount of the **preliminaries** to the **contract sum**, which **contract sum** shall exclude the amount of **preliminaries**. Contingency sum(s) and any provision for cost fluctuations shall be excluded for the calculation of the aforesaid ratio

Option B	The **preliminaries** shall be paid in accordance with an amount agreed by the **principal agent** and the **contractor** in terms of the **priced document** to identify an initial establishment charge, a time-related charge and a final dis-establishment charge. Payment of the time-related charge shall be assessed by the **principal agent** and adjusted from time to time as may be necessary to take into account the rate of progress of the **works**

Lump sum contract

Where the amount of **preliminaries** is not provided it shall be taken as 7.5% (seven and a half per cent) of the **contract sum**, excluding contingency sum(s) and any provision for cost fluctuations.

C 3.0 Adjustment of preliminaries [26.9.4]

Lump sum contract

Where the amount of **preliminaries** is not provided it shall be taken as 7.5% (seven and a half per cent) of the **contract sum**, excluding contingency sum(s) and any provision for cost fluctuations.

Contractor's selection

Select Option A or B

Where the **contractor** does not select an option, Option A shall apply.

Provision of particulars

The **contractor** shall provide the particulars for the purpose of the adjustment of **preliminaries** in terms of his selection. Where completion in **sections** is required, the **contractor** shall provide an apportionment of **preliminaries** per **section.**

Option A	An allocation of the **preliminaries** amounts into Fixed, Value-related and Time-related amounts as defined for adjustment method Option A below, within fifteen (15) **working days** of the date of acceptance of the tender
Option B	A detailed breakdown of the **preliminaries** amounts within fifteen (15) **working days** of possession of the **site**. Such breakdown shall include, inter alia, the administrative and supervisory staff, the use of **construction equipment**, establishment and dis-establishment charges, insurances and guarantees, all in terms of the **programme**

Tender / Quotation no: H23/022AI

Adjustment methods

The amount of **preliminaries** shall be adjusted to take account of the effect which changes in time and/or value have on **preliminaries**. Such adjustment shall be based on the particulars provided by the **contractor** for this

purpose in terms of Options A or B, shall preclude any further adjustment of the amount of **preliminaries** and shall apply notwithstanding the actual employment of resources by the **contractor** in the execution of the **works.**

Option A	The **preliminaries** shall be adjusted in accordance with the allocation of **preliminaries** amounts provided by the **contractor,** apportioned to **sections** where completion in **sections** is required Fixed - An amount which shall not be varied. Value-related - An amount varied in proportion to the **contract value** as compared to the **contract sum**. Both the **contract sum** and the **contract value** shall exclude the amount of **preliminaries**, contingency sum(s) and any provision for cost fluctuations. Time-related - An amount varied in proportion to the number of **calendar days** extension to the date of **practical completion** to which the **contractor** is entitled with an adjustment of the **contract value** [23.2; 23.3] as compared to the number of **calendar days** in the initial **construction period** [26.9.4].
Option B	The adjustment of **preliminaries** shall be based on the number of **calendar days** extension to the date of **practical completion** to which the **contractor** is entitled with an adjustment of the **contract value** [23.2; 23.3] as compared to the number of **calendar days** in the initial **construction period** [26.9.4]. The adjustment shall take into account the resources as set out in the detailed breakdown of the **preliminaries** for the period of construction during which the delay occurred.

Failure to provide particulars within the period stated

Option A	Where the allocation of **preliminaries** amounts for Option A is not provided, the following allocation of **preliminaries** amounts shall apply: Fixed - Ten per cent (10%) Value-related - Fifteen per cent (15%) Time-related - Seventy-five per cent (75%) Where the apportionment of the **preliminaries** per **section** is not provided, the categorised amounts shall be prorated to the cost of each **section** within the **contract sum** as determined by the **principal agent**
Option B	Where the detailed breakdown of **preliminaries** amounts for Option B is not provided, Option A shall apply

C1.3 FORM OF GUARANTEE

DPW-10.2 (EC): VARIABLE CONSTRUCTION GUARANTEE GCC 3rd Edition (2015)

Director-General
Department of Public Works and Infrastructure
Government of the Republic of South Africa

FOR ATTENTION

Mr G. Lukhele
Private Bag X65
Pretoria
0001

Sir,

VARIABLE CONSTRUCTION GUARANTEE FOR THE EXECUTION OF A CONTRACT IN TERMS OF GCC 3rd Edition (2015)

1. With reference to the contract between _____

_____ (hereinafter referred to as the **"contractor"**) and the Government of the Republic of South Africa in its Department of Public Works and Infrastructure (hereinafter referred to as the **"employer"**), Contract/Tender No: H23/022AI, for the _____-(hereinafter referred to as the **"contract"**) for the sum of R _____,(***insert amount in words***)_____, (hereinafter referred to as the **"contract sum"**).

I / We, _____

in my/our capacity as _____ and hereby

representing _____ (hereinafter referred to as the **"guarantor"**) advise that the **guarant**or holds at the **employer**'s disposal the sum of R ***insert amount***, (***insert amount in words***) being 10% of the **contract sum** (excluding VAT), for the due fulfilment of the **contract**.

2. I / We advise that the **guarantor**'s liability in terms of this guarantee shall be as follows:

   (a) From and including the date on which this guarantee is issued and up to and including the day before the date on which the last **certificate of completion** of works is issued, the **guarantor** will be liable in terms of this guarantee to the maximum amount of 10% of the **contract sum** (excluding VAT);

   (b) The **guarantor**'s liability shall reduce to 5 % of the **value of the works** (excluding VAT) as determined at the date of the last **certificate of completion** of works, subject to such amount not exceeding 10% of the **contract sum** (excluding VAT);

   (c) This guarantee shall expire on the date of the last **final approval certificate**.

3. The **guarantor** hereby renounces the benefits of the exceptions *non numeratae pecunia; non causa debiti; excussionis et divisionis;* and *de duobus vel pluribus reis debendi* which could be pleaded against the enforcement of this guarantee, with the meaning and effect whereof I/we declare myself/ourselves to be conversant, and undertake to pay the **employer** the amount guaranteed on receipt of a written demand from the **employer** to do so, stating that (in the **employer**'s opinion and sole discretion):

   (a) the **contractor** has failed or neglected to comply with the terms and/or conditions of the **contract**; or

Tender no: H23/022AI

(b) the **contractor**'s estate is sequestrated, liquidated or surrendered in terms of the insolvency laws in force within the Republic of South Africa.

4. Subject to the above, but without in any way detracting from the **employer**'s rights to adopt any of the procedures provided for in the **contract**, the said demand can be made by the **employer** at any stage prior to the expiry of this guarantee.
5. The amount paid by the **guarantor** in terms of this guarantee may be retained by the **employer** on condition that upon issue of the last **final approval certificate**, the **employer** shall account to the **guarantor** showing how this amount has been expended and refund any balance due to the **guarantor**.

6. The **employer** shall have the absolute right to arrange his affairs with the **contractor** in any manner which the **employer** deems fit and the **guarantor** shall not have the right to claim his release on account of any conduct alleged to be prejudicial to the **guarantor**. Without derogating from the foregoing, any compromise, extension of the construction period, indulgence, release or variation of the **contractor**'s obligation shall not affect the validity of this guarantee.

7. The **guarantor** reserves the right to withdraw from this guarantee at any time by depositing the guaranteed amount with the **employer**, whereupon the **guarantor**'s liability ceases.

8. This guarantee is neither negotiable nor transferable, and

(a) must be surrendered to the **guarantor** at the time when the **employer** accounts to the **guarantor** in terms of clause 5 above, or
(b) shall lapse in accordance with clause 2 (c) above.

9. This guarantee shall not be interpreted as extending the **guarantor**'s liability to anything more than payment of the amount guaranteed.

SIGNED AT _____ ON THIS _____ DAY OF _____ 20_____

AS WITNESS

1. _____

2. _____

By and on behalf of

_____

_____

_____

(insert the name and physical address of the guarantor)

NAME: _____

CAPACITY: _____**(duly authorised thereto by resolution attached marked Annexure A)**

DATE: _____

A. No alterations and/or additions of the wording of this form will be accepted.

B. The physical address of the guarantor must be clearly indicated and will be regarded as the guarantor's *domicilium citandi et executandi,* for all purposes arising from this guarantee.

C. This GUARANTEE must be returned to: _____

DPW-10.4 (EC): FIXED CONSTRUCTION GUARANTEE
GCC 3rd Edition (2015)

Director-General
Department of Public Works and Infrastructure
Government of the Republic of South Africa

FOR ATTENTION

Mr G.Lukhele
Private Bag ***X65***
Pretoria
0001

Sir,

FIXED CONSTRUCTION GUARANTEE FOR THE EXECUTION OF A CONTRACT IN TERMS OF GCC 3rd Edition (2015)

1. With reference to the contract between _____

_____ (hereinafter referred to as the "**contractor"**) and the Government of the Republic of South Africa in its Department of Public Works and Infrastructure (hereinafter referred to as the **"employer"**), Contract/Tender No: ***H23/022AI***, for the ***insert description of Works*** (hereinafter referred to as the **"contract"**), for the sum of R ***insert amount***, (***insert amount in words***), (hereinafter referred to as the **"contract sum"**).

I / We, _____

in my/our capacity as _____and hereby

representing _____ (hereinafter referred to as the "**guarantor"**) advise that the **guarantor** holds at the e**mployer**'s disposal the sum of R ***insert amount***, (***insert amount in words***) being 5% of the **contract sum** (excluding VAT), for the due fulfillment of the **contract**.

2. The **guarantor** hereby renounces the benefits of the exceptions *non numeratae pecunia; non causa debiti; excussionis et divisionis;* and *de duobus vel pluribus reis debendi* which could be pleaded against the enforcement of this guarantee, with the meaning and effect whereof I/we declare myself/ourselves to be conversant, and undertake to pay the **employer** the amount guaranteed on receipt of a written demand from the **employer** to do so, stating that (in the **employer**'s opinion and sole discretion):

   (a) the **contractor** has failed or neglected to comply with the terms and/or conditions of the **contract**; or
   (b) the **contractor**'s estate is sequestrated; liquidated or surrendered in terms of the insolvency laws in force within the Republic of South Africa.

3. Subject to the above, but without in any way detracting from the **employer**'s rights to adopt any of the procedures provided for in the **contract**, the said demand can be made by the **employer** at any stage prior to the expiry of this guarantee.

4. The amount paid by the **guarantor** in terms of this guarantee may be retained by the **employer** on condition that upon the issue of the last **final approval certificate**, the **employer** shall account to the **guarantor** showing how this amount has been expended and refund any balance due to the **guarantor**.

5. The **employer** shall have the absolute right to arrange his affairs with the **contractor** in any manner which the **employer** deems fit and the **guarantor** shall not have the right to claim his release on account of any conduct alleged to be prejudicial to the **guarantor**. Without derogating from the aforegoing, any compromise, extension of the construction period, indulgence, release or variation of the **contractor**'s obligation shall not affect the validity of this guarantee.

6. The **guarantor** reserves the right to withdraw from this guarantee at any time by depositing the guaranteed amount with the **employer**, whereupon the **guarantor**'s liability ceases.

7. This guarantee is neither negotiable nor transferable, and

   (a) must be surrendered to the **guarantor** at the time when the **employer** accounts to the **guarantor** in terms of clause 4 above, or

   (b) shall lapse on the date of the last **certificate of completion** of works.

8. This guarantee shall not be interpreted as extending the **guarantor**'s liability to anything more than the payment of the amount guaranteed.

SIGNED AT _____ ON THIS _____ DAY OF_____ 20____.

AS WITNESS

1. _____

2. _____

By and on behalf of _____

_____

_____
(insert the name and physical address of the guarantor)

NAME: _____

CAPACITY: _____
(duly authorised thereto by resolution attached marked Annexure A)

DATE: _____

A. **No alterations and/or additions of the wording of this form will be accepted.**

B. **The physical address of the guarantor must be clearly indicated and will be regarded as the guarantor's *domicilium citandi et executandi,* for all purposes arising from this guarantee.**

C. **This GUARANTEE must be returned to:** _____

_____

_____

SCOPE OF WORK

PG-01.1 (EC) SCOPE OF WORKS – GCC 3rd Edition (2015)

Project title:	**PAFURI LAND PORT OF ENTRY (LPOE): SUPPLY AND INSTALLATION OF SOLAR PANEL AND WASTE WATER FACILITY**		
Tender no:	**H23/022AI**	**Reference no:**	**H23/022AI**

C3. Scope of Works

CONTENTS

The project covers the installation of a complete solar installation combined with all electrical -, building -, structural and civil works required to complete the installation successfully.

See PG-03.1 at end of this document.

The GCC contact applies.

The requirements are laid down in this document but can be summarized that it requires competent and experienced site supervision at all times.

Construction will be completed within 12 months from acceptance of tender.

None.

The service provider must provide all facilities needed like water, electricity, ablution, site office etc.

The site is located in an area where temperatures average 30˚C during summertime.

The standard specifications on which this contract is based are the **South African Bureau of Standards Standardized Specifications for Civil Engineering Construction SABS 1200.** *(Note to compiler. "SABS" has been changed to "SANS"; the SABS 1200 specifications are due to be replaced in the foreseeable future by SANS 2100)*

1) . **Department of Public Works** standard electrical specification. Part A, B & C.
2). SANS1200

Although not bound in nor issued with this Document, the following Sections of the Standardized Specifications of SABS 1200 shall form part of this Contract:

A - 1986 - GENERAL / D – (etc, to be provide by compiler)

3.5 PROJECT SPECIFICATIONS:

Status

The Project Specification, consisting of two parts, forms an integral part of the contract and supplements the Standard Specifications.

Part1 A contains a general description of the works, the site and the requirements to be met.

Part B contains variations, amendments and additions to the Standardized Specifications and, if applicable, the Particular Specifications.

In the event of any discrepancy between a part or parts of the Standardised of Particular Specifications and the Project Specification, the Project Specification shall take precedence. In the event of a discrepancy between the specifications, (including the Project Specifications) and the drawings and / or the Bill of Quantities, the discrepancy shall be resolved by the Engineer before the execution of the work under the relevant item.

3.5.1 GENERAL

PS-1 PROJECT DESCRIPTION:

The project consists of the following:

3.5.1.1 Installation of a solar system.
3.5.1.2 Electrification of a building to house the solar control and energy storage installation.
3.5.1.3 Electrical installation on site.
3.5.1.4 Relocation of sewer system (wet works)

3.5.2 AMENDMENTS TO THE STANDARD AND PARTICULAR SPECIFICATION:

No.

C3.5.3 PARTICULAR SPECIFICATIONS:

C3.5.3.1 SOLAR INSTALLATION

CONTENTS

1. SCOPE OF CONTRACT

1.1 The contract works consists of the supply, delivery, installation, connection, testing, commissioning, and handing over of the off-grid solar PV system at Pafuri Land port of entry as specified hereinafter to the complete satisfaction of the Client and Principal Agent, comprising of the following:

Refer to Part C3 and Attached Appendices for details of Scope of Works and Scope of Contract.

The design, supply, installation, testing, commissioning and handover of a complete PV and BESS which is to be purchased and owned by the Client. Refer to the attached Appendices and drawings for additional information to be included as part of the tender submission. The site is located at:

GPS coordinates:

LAT: 22° 26’ 53,33” S
LONG: 31° 18’ 49,49” E

The Client will procure the services of an EPC or contractor to design supply and install the PV and BESS with a 1-year maintenance plan included to maintain the equipment for the plant. A performance agreement will also be put in place to ensure that the plant achieves optimal performance. The details of this agreement are included in this tender document and must be submitted with the tender. Refer to the attached Appendices for further information and schedules to be completed.

The solar PV installation will generally comprise of:

Tier 1 solar modules manufactured by an internationally recognized manufacturer and supported locally.

DC and AC cabling to be supplied and installed in accordance with the South African National Standards. All cabling that is exposed to weather and possible theft is to be securely covered and fixed with galvanized trays. Other exposed cables are to be UV resistance for the life of the cables and solar PV installation.

DC Combiner boxes are to be supplied and installed with the necessary protection and safety mechanisms to sufficiently protect the cabling and solar array installations.

AC panels and DBs are to be supplied and installed in accordance with the South African National Standards and to the Electrical Consulting Engineers approval.

Power conversion system and a management and control system.

Generator integration system.

The BESS installation will generally comprise of:

Battery system consisting of Lithium-Ion family batteries.

Power conversion system.

Plant management and control system including battery management system.

SURGE - AND LIGHTNING PROTECTION:

Surge Protection:

Installation is to be provided with the highest standard of protection to sufficiently protect the installation from power surges. This is to be incorporated in the tender proposal and must include protection for the DC system, AC system and communication system.

Lightning Protection:

The system must be provided with a lightning protection system according to SANS.
AC connection points to the existing LV infrastructure will be coordinated and finalized in conjunction with the Electrical Engineers. Contractor is to ensure sufficient allowance is included for connecting to existing infrastructure. The contractor will be deemed to have inspected conditions, sizes, cable routes etc. onsite before submitting a tender.

A Monitoring system is to be supplied, installed, commissioned and setup at practical completion. The monitoring interface is to display the Solar PV power, Facility Bulk Power, BESS Power, Generator Power and Total Facility Power (i.e., Solar + Bulk Power + BESS + GEN) on a single interface to the satisfaction of the Electrical Engineer. Communications between the bulk meter and the monitoring unit can be via a radio communication system, hard wired or via GSM all to be completed by the Solar PV contractor.

Separate Check meters (Three-phase CT meter with communication facilities) are to be installed at the points of connection to the BESS infrastructure and Separate Check (Three-phase CT meter with communication facilities) meters are to be installed at the points of connection to the Solar PV infrastructure by the PV and BESS Contractor. The meters are to be installed and operational at practical completion and must be programmed for four quadrant operation to satisfaction of the Electrical Engineer.

Full compliance with NRS 097-2-1:2017 is a requirement and must be allowed for in the pricing schedule and tender price.

All GSM sim cards required for remote access are to be provided by the PV & BESS contractor and included in the tender to accommodate a minimum of 3 years of access.

2. CIVIL / STRUCTURAL WORK

Civil / Structural Engineers' signoff by the client's appointed and registered Structural Engineer is to be completed prior to commencing works on the site. The following is to be submitted to the Principal Agent:

Structural Engineers' Report confirming that all bases, plinths, foundations, roofs etc. for installing of the BESS and PV system complies with all relevant South African codes and specifications (Before installation commences).

The clients structural engineer must confirm in writing (on completion of the installation) that:
The structural components have been constructed according to his / her designs.
All relevant quality control measures have been applied and that the structural work has passed the quality control measure (cable test results, reinforcing steel inspections etc.).
The visual quality of work is acceptable.

3. ELECTRICAL WORK

The contractor's electrical engineers must confirm in writing that:
The system has been inspected and has been installed as per the approved design.

The installation complies with all the requirements and standards as specified in the manufacturer's specifications and that none of the guarantees and/or warranties have been compromised.

All warranties and guarantees are in place and made out in favour of the employer.

The system has been fully commissioned and is now functional as per the approved design.

4. OPERATION AND MAINTENANCE

The PV & BESS Contractor is to allow in his tender price for a one Year Operation and Maintenance agreement as part of this tender submission which is to include for as a minimum.

Periodic Cleaning & Maintenance of Installed System
General maintenance of the BESS system including but not limited to power conversion system, cabling, monitoring system and batteries.

General maintenance of the PV system including but not limited inverters, cabling, and monitoring system.

Replacement of equipment on-site (complete with labour) of any items within the guarantee and warrantee period.

The guarantees and warrantees will commence from the date of Practical Completion.

Monthly Reports to be issued to key Management personnel indicating the:

Performance of the system vs the designed
Down time of the system and reasons for
Cost of energy

4.1 Retention monies will only be released after the 12 months if the solar PV & BESS system reached the tendered performance levels.

5. HEALTH AND SAFETY

5.1 The PV & BESS Contractor is to sign and accept the Client's Health and Safety Consultant's documentation and must fully comply with the Health & Safety requirements of the appointed Client's Consultant. The Contractor is to ensure a full time Health and Safety Representative on-site in accordance with the OHS Act (Act 85 of 1993). The PV & BESS contractor is to include in the pricing for site establishment in accordance with the Health and Safety Specification (i.e., 1.8m diamond Mesh with Black Shade Cloth around site, Full lockable access gate, toilets etc.). Refer to other parts of this document and the attached Appendices for further information & H&S requirements.

6. AC ELECTRICAL INSTALLATION

6.1 All AC cables must be PVC/PVC/SWA/PVC cable according to SANS1507 suitably rated for the application. Only cable with copper conductors will be acceptable.

DC combiner boxes for combining the solar PV module strings will be installed in locations determined by the successful tenderer. The position will be determined to minimize DC losses and cable lengths.

AC boards will be installed typically adjacent to the inverters to combine and parallel the inverter AC outputs into a single supply cable which will be terminated into the centres existing LV distribution network.

The containment from the DC combiner boxes to the inverters, from inverters to AC DB and AC DB to the point of connection will be in **galvanized trunking or cable trays** fitted with covers to reduce the exposure of the cables to the elements as well as limit the risk of cable theft. Only return flange type trays will be approved. The trunking or tray will be fixed to horizontal a 42mm x 42mm supports trunking which will be clamped to the roof profile. Galvanized covers will be securely fixed to the containment. The containment will be earthed in accordance with the SANS10142 requirements.

The AC and DC cables for the photovoltaic power installation can be divided into the following sections:

Strings to Combiner box	-	Typically, single core solar cables
Combiner Box to Inverter	-	Typically, SANS1507-3 type 2, 3 or 4 Core

Inverters to Centre LV Connection	-	CuPVC/SWA/ECC/PVC Or XLPE/SWA/ECC/XLPE cables Typically, SANS1507-3 type 4 Core Cu PVC/SWA/ECC/PVC or XLPE/SWA/ECC/XLPE cables

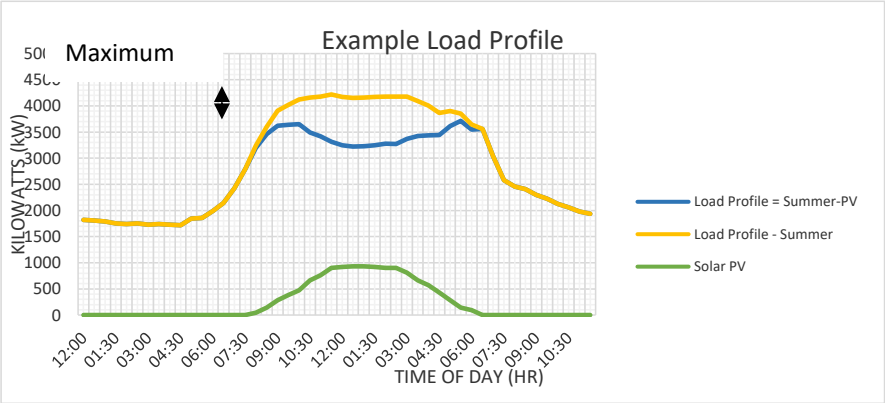
All cable sizing is done according to relevant SANS and international standards.

7. LV CONNECTION POINTS

7.1 The LV room main DB must be used as a PV & BESS connection point and must be rated for the size of the Grid-following or Grid-forming inverters connecting to it. Typically, the nearest connection point will be utilized to reduce AC losses. A check meter will be installed for the facility to independently monitor the performance of the PV & BESS system.

8. METERING

8.1 A monitoring system and meters will be installed in the solar PV plant AC panels and the BESS AC panels, which combine the outputs of the grid-following inverters and grid-forming inverters. The solar PV contractor will monitor the energy meters remotely via a GSM connection. The energy produced by the solar PV plant must be displayed graphically on a web interface. The discharge of the grid-forming inverters will also be displayed graphically. The clients appointed Electrical Engineer will provide further details for the look and feel of the information to be displayed.



8.2 Typically, the energy from the solar PV plant (A) will be profiled with the bulk meter (B) profile superimposed on the same display with A+B profiled to simulate the Load profile as indicated in the graphic below:

All check meters must be smart meters of the type approved by the client's appointed electrical engineer.

8.3 The consultant engineer will be the system administrator for the monitoring system and the client will be a viewer of the monitoring system.

8.4 The following information must be displayed:

- Energy produced by the PV system (kW)
- Battery discharge(kW)
- Generator power output (kW)
- The total relevant load (kWh)

8.5 Additional check meters must be installed by the contractor to verify the above, these meters must be installed at the point/s of connection into the centre's LV network and monitored by the EPC. Readings from these check meters will be used in determining the plant's performance when considering the one-year performance guarantee.

8.6 It is required that a meter must be installed on the bulk supply from council to enable the accurate calculation of the kVA demand savings for the installation as this is a critical component of the feasibility of the PV & BESS project.

8.7 An Irradiance sensor is to be installed to ensure that the systems performance metrics are up to spec. This data must be made visually available on the monitoring platform.

9. PHOTOVOLTAIC (PV) SYSTEM SPECIFICATIONS

9.1 INVERTERS (GRID-FORMING OR FOLLOWING)

It is proposed that multiple inverters are to be installed to provide the most economic and efficient solar PV system. The benefit of multiple inverters connected in parallel is to reduce the amount of energy losses in the event of an inverter failure. The more inverters the less the impact on the power production should there be a failure. The system should also be designed to accommodate for a further expansion to a fully OFF-GRID system in the future.

9.2 The inverters shall be designed and manufactured to conform to meet the SANS10142 & NRS097requirements as well as the NERSA and local by-laws requirements. In summary the inverters provided as part of the tender shall conform to:

9.1.1 GENERAL INVERTER SPECIFICATIONS:

Output Voltage/Phase/Frequency		
Output Voltage/Phase/Frequency	:	400V, 3PH, 50Hz.
Power Output (W)	:	Recommend between 40 – 110kW per inverter.
Efficiency:	:	+98%. Curves to be supplied by tenderer.
Ingress Protection:	:	To suit application (min IP65)
Inverter type	:	Grid -forming.
Specification	:	SANS approved and compliance with grid connection code for battery energy storage facilities (BESF) connected to the electricity transmission system (TS) or the distribution system (DS) in South Africa Draft 5.2 or higher if available.
	:	Must be tested as per NRS 097.

9.1.2 WARRANTIES:

Minimum of a 10-year product warrantee will be accepted.

9.3 SOLAR PV MODULES (PANELS)

The modules to be installed to the solar PV project shall be designed and manufactured to the IEC 61730 and IEC 61215 standards with a minimum specification to accommodate the following:

9.3.1 CLIMATE CONDITIONS:

- Operating temperature range : -40°C to 85°C
- Maximum static load, front (e.g., hail or snow): : 5400 Pa
- Maximum static load, back (e.g., wind) : 2400Pa
- Maximum hailstone impact (diameter / velocity) : 25mm / 23m/s or 82km/hr

9.3.2 TYPE OF MODULE TECHNOLOGY:

Tier 1 Polycrystalline or Monocrystalline as proposed by the tenderer.
Recommended power output (W) of 550W per module.

9.3.3 WARRANTEES:

Minimum of a 10-year product warrantee will be accepted.

A minimum of a 25-year Linear Performance guarantee on the module power output will be accepted.

9.4 ENERGY STORGE DEVICE (BESS)

9.4.1 STORAGE DEVICES

Lithium-Ion family.

9.3.2 SPECIFICATIONS

SANS approved and compliance with grid connection code for battery energy storage facilities (BESF) connected to the electricity transmission system (TS) or the distribution system (DS) in South Africa draft 5.2 or higher available.

10. PV SYSTEM CAPACITY

10.1 The capacity of the system must be designed by the contractor for 220 kVA AC peak measured on the AC side at the point of feeding into the existing electrical network. If more than one feed-in points are used the sum of the AC system Peak kW at feed-in points must total the required kW peak. It is recommended to implement a solar PV solution with an approximately 1.3 DC to AC ratio. This might increase dependent on the Bess interface philosophy adopted by the contractor i.e., DC coupled solar PV solution. Grid-forming inverters are required to be installed in a designated room. The solar PV system must be designed with a minimum soiling derating of 3%.

11. BATTERY ENERGY STORAGE SYSTEM (BESS) SPECIFICATIONS

11.1 The complete BESS must comply with “Grid Connection Code for Battery Energy Storage Facilities (BESF) connected to the Electricity Transmission system (TS) or the Distribution System (DS) in South Africa”, Draft 5.2 or latest available.

11.2 The BESS must be able to supply the entire load.

11.3 The BESS system is to be installed in the designated battery storage area.

11.4 The BESS system must be able to supply peak load increases of 20% from 250kW for approximately 1min. This is to account for motor starting currents.

11.5 The BESS must comply with Eskom standard 240-139687256 in terms of functionality, isolation, and testing. This includes but is not limited to section 3.16.8, 3.20.6.4, 3.20.7, 3.7.1,3.7.

11.6 A BESS replacement cost (including power conversion system) must be provided with the chosen system in correlation to the end of the BESS lifetime.

12. BESS CAPACITY

12.1 The purpose of the BESS is to provide power to the facility.

12.2 The system storage size must be designed by the contractor to accommodate 1500kWh load per day.

12.3 The BESS must be designed for a 10-year period with no replacement of equipment (storage or power conversion system). Where necessary the 10 years must be backed up with extended warranties of which the cost must form part of the tender price.

12.4 A replacement cost for the BESS after its approximated lifetime must be provided and included in any financial analysis. A general replacement year and system kWh replacement percentage must be provided.

12.5 The tender must optimise the BESS for his offer using the financial data as provided in Part T1.2 “Tender data”

12.6 The BESS must be designed to have at least 80% useable capacity (in kWh) left after 10 years compared to the useable capacity of the system when newly installed providing performance results as provided by the tenderer in Part T2.1.5 “Tender Return Data”.

12.7 An estimated load profile for the facility can be provided in excel format.

13. GENERATOR INTEGRATION

13.1 A Generator switch-on should commence as the BESS capacity reaches its lower disconnect SOC (State of Charge) threshold, not after the threshold is reached. No dips in power should be experienced from the change-over from BESS to generator.

13.2 Normal generator functionality should not be impeded by the PV&BESS system and should still function as a back-up in case of a BESS system fault.

13.3 The generator output power must be displayed on the monitoring platform.

13.4 The PV system must be able to feed in along with the generator to elevate some load from the generator. The load supplied via the Generator should not be decreased below 30% capacity of the generator.

14. CONTRACTOR'S PV SYSTEM YIELD

14.1 The PV system yield will be measured at the point/s where energy is fed into the existing electrical network. This will correlate to the load of the building.

14.1.1 Loses and degradation:

- DC cable losses;
- Inverter losses;
- AC cable losses;
- PV modules degradation;
- Losses due to soiling of PV modules;
- All other losses applicable.

14.1.2 The system must be designed based on the meteorological data for the location of the plant. The meteorological data utilized by the contractor must be indicated with the tender.

14.2 The risk for the following factors with an effect on the yield will be with the Employer:

a.) Solar irradiation below 10% less than indicated by the applied meteorological data.
b.) Malicious damage or theft.
c.) Force majeure, other than the first 10% reduction in irradiation.

14.3 The risk for the following factors with an effect in the yield will be with the contractor:

a.) Plant failure, including but not limited to the panels, inverters, connections etc.
b.) Any omission or neglect by the contractor or any of his sub-contractors, suppliers etc.
c.) Solar irradiation up to 10% less than the applied meteorological data.

14.4 Within 15 days of the annual anniversary from the date when the system was fully commissioned and operational the contractor must submit to the client an annual performance audit. The purpose of the audit is to provide a summary of the system's performance and if there is a shortfall the audit should be clear as to the reasons for the shortfall.

14.5 If the yield of the plant is less than that guaranteed the Contractor must rectify the system as to meet the yields guaranteed. The retention monies will only be released once the system operates / delivers as tendered.

14.6 The tenderer must guarantee the yields as submitted in PART T2.1.5.

14.7 The energy guarantee will commence from the date of practical completion.

15. CONTRACTOR'S BESS SYSTEM PERFORMANCE DATA

15.1 The BESS system performance will be measured at the point/s where energy is fed into / taken out of the Existing electrical network.

15.2 The BESS system performance must be calculated considering the following:

15.2.1 The total building load must be supplied via the BESS

15.2.2 System charging / discharging losses.

15.3 The risk for the following factors with an effect on the performance of the BESS will be with the Employer:

- Malicious damage or theft
- Drastic change (higher than 10%) of facility's load profile
- Force majeure

15.4 The risk for the following factors with an effect in the performance of the BESS will be with the contractor:

- Plant failure
- Any omission or neglect by the contractor or any of his sub-contractors, suppliers etc.

15.5 Within 15 days of the annual anniversary from the date when the system was fully commissioned and operational the contractor must submit to the client an annual performance audit. The purpose of the audit is to provide a summary of the system's performance and if there is underperformance the audit should be clear as to the reasons for the underperformance.

15.6 The tenderer must guarantee the performance as submitted in part T2.1.5 items 3, 4 and 5.

15.7 In order to guarantee the system performance, the contractor must operate and maintain the system for one years from date of practical completion.

16. GUARANTEES AND WARRANTEES

16.1 CONTRACTOR'S GUARANTEE:

The Contractor will be required to guarantee the installation against faulty workmanship and materials for a period of three years (36 months) from the practical completion date.

16.2 EQUIPMENT GUARANTEES AND WARRANTEES:

All guarantees and warrantees must be in the name of the employer and will commence at practical completion. A 15 (fifteen) year guarantee on the BESS is required.

17. COMMISSIONING, WITNESSING & HANDOVER

17.1 The Consultant must witness and verify the operation of the entire system. Prior to this, the Contractor must also undertake full commissioning of the system. These commissioning instructions must be provided in a checklist format that requires the Contractor and Consultant's initials.

17.2 Prior to offering for acceptance any aspect of the BESS installation, the Contractor must have completed, snagged (zero snagging objectives) and tested all systems. It is essential that the works are completed, checked and signed off by both the Contractor and Consultant prior to formal handover to the Client and Clients representatives.

17.3 Documentation must be issued prior to the agreed Client demonstration dates for review by the Consultant, not on the date of demonstration.

17.4 All of the above information must be included in a commissioning report compiled by the Contractor, detailing all the results from the commissioning. This report must include in addition to the above:

17.4.1 Detailed list of all commissioning dates, records of all functional/commissioning testing undertaken.

17.4.2 List of any future seasonal testing required and a written list of outstanding commissioning issues.

18. AS-BUILT DRAWINGS

18.1 The As-Build drawings must be to scale (where applicable) and must include all (but not limited to):

18.1.1 Electrical Single Line Diagrams and Schematics.

18.1.2 PV system drawings including general arrangement, single line diagrams and dimensioned outline diagrams.

18.1.3 BESS drawings including general arrangement, single line diagrams and dimensioned outline drawings.

18.1.4 AC connection point details.

18.1.5 Connection details to the Generator from the PV or BESS system, if existing.

18.2 All as-built drawings must accurately correspond to installed and labelled equipment on-site. This will be checked by the Consulting Engineers prior to Practical Completion.

19. LOW VOLTAGE SWITCHGEAR AT FEED-IN POINTS AND ELSE WHERE IN THE NETWORK

19.1 The contribution of addition of the BESS system on the prospective fault currents in the LV network must be evaluated by the contractor and the necessary steps taken to rectify any switchgear or switch boards that will not be suitable after the addition of the BESS system.

19.2 Full calculation details of the network fault current as well as the proposed rectification must be submitted to the engineer for approval before implementation commences.

20. APPROVALS / REGISTRATION OF PV & BESS SYSTEM

20.1 The contractor must obtain all approvals or registration required from or with any authority for the PV & BESS system.

20.2 The contractor must manage the process of registration and/or approvals and must inform the client or the representative of any required actions by the client.

20.3 The contract will be signed only if all relevant requirements for approval / consent is achieved in writing within 6 (six) weeks from issuing a letter of intent to sign a contract with the successful tenderer by the Client. Neither party to the contract shall have a claim against each other if all the relevant requirements are not achieved within the time stipulated.

21. REQUIREMENTS FOR PRACTICAL COMPLETION

21.1 PV-system fully operational, commissioned, completed and site tidied.

21.2 BESS fully operational, commissioned, completed and site tidied.

21.3 O&M manuals completed and approved.

21.4 “As-built” drawings completed and approved.

21.5 All statutory requirements complied with.

21.6 Structural engineer’s letter and sign off.

21.7 Electrical engineer’s letter and sign off.

21.8 System registered with authority/ties.

21.9 Training of Client’s staff completed.

22. OPERATION & MAINTENANCE MANUALS

22.1 This is to include all the equipment operational manuals together with a building specific manual detailing the operation of the Electrical System is functional. This is to include a building specific document detailing all maintenance that will be required on the system as well as detailing what profession will be required to action each item. The building specific manuals must be able to be understood by the building manager and provide skill sets requirements should the information be technically intense and require specialists to manage certain aspects of the building. The completed commissioning reports must be included together with all signed handover and approval documents.

22.2 The following documentation must be part (but not limited to) of the handover process and must be included in the 3 (three) hard copies and 3 (three) CDs with electronic copies of the information of O&M Manuals:

22.2.1 Specification sheets of the type of equipment used.

22.2.2 Critical spares schedule with supplier contact sheet.

22.2.3 Test / commissioning sheets (signed off by both the Contractor and Consultant).

22.2.4 Guarantees and warranties formally offered in accordance with the contract.

22.2.5 Training documentation (in electronic and hard copy), including a schedule of all those operatives that have attended training.

22.2.6 The commissioning results, certification, graphics, schedules, warrantees, and test sheets must all form part of the documentation.

22.2.7 Access and login details to the BESS monitoring website, including all URL's and passwords.

22.2.8 Contact details of the installation technicians and maintenance technicians.

22.2.9 Completed and signed Electrical Certificates of Compliance.

22.2.10 Serial numbers of all inverters and battery systems.

22.3 An example of the O&M file index is given below:

22.3.1 Contact Register.

22.3.2 Warrantee's, Guarantee's (All PV & BESS equipment).

22.3.3 Approvals / sign-off / registrations:

a.) Statutory approval
b.) Statutory sign-off
c.) Structural sign-off
d.) Electrical sign-off
e.) Commissioning
f.) Practical Completion
g.) Registration with NERSA and other authorities

22.4 As Built Design Drawings.

22.5 Equipment Data Sheets and Serial Numbers.

22.6 Distribution Boards.

22.7 Certificates of Compliance.

22.8 Commissioning Results.

22.9 Instrumentation Calibration Certificates.

22.10 General Maintenance.

22.11 Emergency Plan.

23. TRAINING ON COMPLETION OF THE INSTALLATION

23.1 Training must be done to ensure that Centre management staff have all the information and understanding needed to operate and maintain the features and systems in the building. Two full training sessions (each session for complete full training on the plant) must be done to ensure full understanding of the system by the staff. Training for Clients support staff must have been undertaken prior to acceptance of any systems. This must be provided for 6 individuals.

23.2 Irrespective of this clause, the Contractor is responsible for maintenance and operating during the first year.

23.3 Training must include the following:

23.3.1 Going through the Operation & Maintenance manuals and explaining what it contains and what the purpose of each document is.

23.3.2 The required maintenance required for the system.

23.3.3 Allow each operator hands on experience on the system to familiarize them to the system and ask any related questions.

23.3.4 All occupational Health and Safety issues must be explained to the staff.

23.3.5 A detailed troubleshooting guide must be reviewed, showing methods to troubleshoot problems on the system.

23.3.6 A handover certificate shall be completed to record the acceptance of the package for any given project. For formal handover to occur, the preceding sections must have been adhered to with associated documentation. Subject to the requirements of the Contract, Practical Completion will not be given until satisfactory handover of the system has been achieved.

23.3.7 Firefighting training and firefighting procedures.

24. HANDOVER CRITERIA AFTER THREE YEAR MAINTENANCE CONTRACT

The maintenance contract must include for the following items in year 3 in anticipation of the handover to the employer:

24.1 The system must have been cleaned and serviced in the week leading up to handover.

24.2 Thermal imaging of the system must be available with a report confirming that all of the identified hot spots, faults and any other issues identified by the thermal survey have been rectified.

24.3 The contractor must allow for a comprehensive training session for Centre Management on the system. (Training the same as on completion of the system).

24.4 At handover the contractor must hand over to Centre Management all logbooks and site records confirming that the maintenance as per the manufacturer's specifications has been carried out and is up to date and that all faults have been rectified.

24.5 A complete review of the system has been carried out by the contractor and a statement is provided confirming that the system is performing as per the design, in terms of output etc. If the system is not performing as per the design, then it is the contractor's liability to carry out any remedials or replacement of components required to ensure the system's performance is as per

the design.

25. DRAWINGS

All drawings provided are provided for information only. The contractor must prepare and submit all drawings necessary for the design, approval, and construction of the project.

26. FIRE CONDITIONS

A full firefighting procedure must be provided to the facility as part of the O&M manuals.

27. DC CABLE

27.1 All DC cables must be suitable for the environment in which it will be installed and rated for 1.5kV DC.

27.2 Specifications:

- SANS / IEC 62930, SANS 1507 and TÜV2 Pfg 1169. (As applicable for the South African environment).
- Temperature range: -15°C to 90°C. (maximum continuous conductor operating temperature).
- UV and ozone resistant.
- Oil, moisture and chemical resistant

28. COMMUNICATION CABLE

28.1 All communication cables must be suitable for the environment in which it will be installed with specific reference to UV resistance.

C3.5.3.2 ELECTRICAL INSTALLATION

3.5.3.2 Electrical installation.

PART 1 – GENERAL

1. TESTS

After completion of the works and before practical completion is achieved, a full test will be carried out on the installation for a period of sufficient duration to determine the satisfactory working thereof. During this period the installations will be inspected and the Contractor shall make good, to the satisfaction of the Principle Agent/Electrical Engineer or the employer, any defects which may arise.

The Contractor shall provide all instruments and equipment required for testing and any water, power and fuel required for the commissioning and testing of the installations at completion.

2. MAINTENANCE OF INSTALLATIONS

With effect from the date of the Practical completion Certificate the Contractor shall at his own expense undertake the regular servicing of the installation during the maintenance period and shall make all adjustments necessary for the correct operation thereof.

If during the said period the installations is not in working order for any reason for which the Contractor is responsible, or if the installations develop defects, he shall immediately upon being notified thereof take steps to remedy the defects and make any necessary adjustments.

Should such stoppages however be so frequent as to become troublesome, or should the installations otherwise prove unsatisfactory during the said period the Contractor shall, if called upon by the Principle Agent/Electrical Engineer or the Employer, at his own expense replace the whole of the installations or such parts thereof as the Principal Agent/Electrical Engineer or the Employer may deem necessary with apparatus specified by the Principal Agent/Electrical Engineer or the Employer.

3. REGULATIONS

The installation shall be erected and tested in accordance with the Acts and Regulations as indicated in the scope of works.

4. NOTICES AND FEES

The Contractor shall give all notices required by and pay all necessary fees, including any inspection fees, which may be due to the local Supply Authority.

On production of the official account, only the net amount of the fee charged by the Supply Authority for connection of the installation to the supply mains, will be refunded to the Contractor by the Employer.

5. SCHEDULE OF FITTINGS

In all instances where schedule of light, socket outlet and power points are attached to or included on the drawings, these schedules are to be regarded as forming part of the specification.

6. QUALITY OF MATERIALS

Only materials of first class quality shall be used and all materials shall be subject to the approval of the Employer. Departmental specifications for various materials to be used on this Contract are attached to and form part of this specification.

Wherever applicable the material is to comply with the relevant South African Bureau of Standards, specifications, or to IEC Specifications, where no SANS Specifications exist.
Materials wherever possible, must be of South African manufacture.

7. CONDUIT AND ACCESSORIES

The type of conduit and accessories required for the service, i.e. whether the conduit and accessories shall be of the screwed type, plain-end type or of the non-metallic type and whether metallic conduit shall be black enamelled or galvanised, is specified in Part 2 of this specification.

Unless other methods of installation are specified for certain circuits, the installation shall be in conduit throughout. No open wiring in roof spaces or elsewhere will be permitted.

The conduit and conduit accessories shall comply fully with the applicable SANS specifications as set out below and the conduit shall bear the mark of approval of the South African Bureau of Standards.

a) Screwed metallic conduit and accessories: SANS 61386-1 and 21.
b) Plain-end metallic conduit and accessories: SANS 61386-1 and 21.
c) Non-metallic conduit and accessories: SANS 61386-1 and 21.

All conduit fittings except couplings, shall be of the inspection type. Where cast metal conduit accessories are used, these shall be of malleable iron. Zinc base fittings will not be allowed.

Bushes used for metallic conduit shall be brass and shall be provided in addition to locknuts at all points where the conduit terminates at switchboards, switchboxes, draw-boxes, etc.

Draw-boxes are to be provided in accordance with the “Wiring Code” and wherever necessary to facilitate easy wiring.

For light and socket outlet circuits, the conduit used shall have an external diameter of 20mm. In all other instances the sizes of conduit shall be in accordance with the “Wiring Code” for the specified number and size of conductors, unless otherwise directed in part 2 of this specification or indicated on the drawings.

Only one manufactured type of conduit and conduit accessories will be permitted throughout the installation.

Running joints in screwed conduit are to be avoided as far as possible and all conduit systems shall be set or bent to the required angles. The use of normal bends must be kept to a minimum with exception of larger diameter conduits where the use of such bends is essential.

All metallic conduit shall be manufactured of mild steel with a minimum thickness of 1,2mm for plain-end conduit and 1,6mm in respect of screwed conduit.

Under no circumstances will conduit having a wall thickness of less than 1,6mm be allowed in screed laid on top of concrete slabs.

Bending and setting of conduit must be done with special bending apparatus manufactured for the purpose and which are obtainable from the manufacturers of the conduit systems. Damage to conduit resulting from the use of incorrect bending apparatus or methods applied must on indication by the Department’s inspectorate staff, be completely removed and rectified and any wiring already drawn into such damaged conduits must be completely renewed at the Contractor’s expense.

Conduit and conduit accessories used for flame-proof or explosion proof installations and for the suspension of luminaires as well as all load bearing conduit shall in all instances be of the metallic screwed type.

All conduit and accessories used in areas within 50 km of the coast shall be galvanised to SANS 32 and SANS 121.

Tenderers must ensure that general approval of the proposed conduit system to be used is obtained from the local electricity supply authority prior to the submission of their tender. Under no circumstances will consideration be given by the Department to any claim submitted by the Contractor, which may result from a lack of knowledge in regard to the supply authority's requirements.

8. CONDUIT IN ROOF SPACES

Conduit in roof spaces shall be installed parallel or at right angles to the roof members and shall be secured at intervals not exceeding 1,5m by means of saddles screwed to the roof timbers.

Nail or crampets will not be allowed.

Where non-metallic conduit has been specified for a particular service, the conduit shall be supported and fixed with saddles with a maximum spacing of 450 mm. The Contractor shall supply and install all additional supporting timbers in the roof space as required.

Under flat roofs, in false ceilings or where there is less than 0,9m of clearance, or should the ceilings be insulated with glass wool or other insulating material, the conduit shall be installed in such a manner as to allow for all wiring to be executed from below the ceilings.

Conduit runs from distribution boards shall, where possible terminate in fabricated sheet steel draw-boxes installed directly above or in close proximity to the boards.

9. SURFACE MOUNTED CONDUIT

Wherever possible, the conduit installation is to be concealed in the building work; however, where unavoidable or otherwise specified under Part 2 of the specification, conduit installed on the surface must be plumbed or levelled and only straight lengths shall be used.

The use of inspection bends is to be avoided and instead the conduit shall be set uniformly, and inspection coupling used where necessary.

No threads will be permitted to show when the conduit installation is complete, except where running couplings have been employed.

Running couplings are only to be used where unavoidable and shall be fitted with a sliced couplings as a lock nut.

Conduit is to be run on approved spaced saddles rigidly secured to the walls.

Alternatively, fittings, tees, boxes, couplings etc., are to be cut into the surface to allow the conduit to fit flush against the surface. Conduit is to be bedded into any wall irregularities to avoid gaps between the surface and the conduit.

Crossing of conduits is to be avoided, however, should it be necessary purpose-made metal boxes are to be provided at the junction. The finish of the boxes and positioning shall be in keeping with the general layout.

Where several conduits are installed side by side, they shall be evenly spaced and grouped under one purpose-made saddle.

Distribution boards, draw-boxes, industrial switches and socket outlets etc., shall be neatly recessed into the surface to avoid double sets.

In situations where there are no ceilings the conduits are to be run along the wall plates and the beams.

Painting of surface conduit shall match the colour of the adjacent wall finishes.

Only approved plugging materials such as aluminium inserts, fibre plugs, plastic plugs, etc., and round-head screws shall be used for fixing saddles, switches, socket outlets, etc., to walls, wood plugs and the plugging in joints in brick walls are not acceptable.

10. CONDUIT IN CONCRETE SLABS

In order not to delay building operations the Contractor must ensure that all conduits and other electrical equipment which are to be cast in the concrete columns and slabs are installed in good time.

The Contractor shall have a representative in attendance at all times when the casting of concrete takes place.

Draw-boxes, expansion joint boxes and round conduit boxes are to be provided where necessary. Sharp bends of any nature will not be allowed in concrete slabs.

Draw and/or inspection boxes shall be grouped under one common cover plate and must preferable be installed in passages or male toilets.

All boxes, etc., are to be securely fixed to the shuttering to prevent displacement when concrete is cast. The conduit shall be supported and secured at regular intervals and installed as close as possible to the neutral axis of concrete slabs and/or beams.

Before any concrete slabs are cast, all conduit droppers to switchboards shall be neatly spaced and rigidly fixed.

11. FLEXIBLE CONNECTIONS FOR CONNECTING UP OF STOVES, MACHINES, ETC.

Flexible tubing connections shall be of galvanised steel construction, and in damp situations of the plastic sheathed galvanised steel type. Other types may only be used subject to the prior approval of the Department's site electrical representative.

Connectors for coupling onto the flexible tubing shall be of the gland or screw-in types, manufactured of either brass or cadmium or zinc plated mild steel, and the connectors after having been fixed onto the tubing, shall be durable and mechanically sound.

Aluminium and zinc alloy connectors will not be acceptable.

12. WIRING

Except where otherwise specified in Part 2 of this specification, wiring shall be carried out in conduit throughout. Only one circuit per conduit will be permitted.

No wiring shall be drawn into conduit until the conduit installation has been completed and all conduit ends provided with bushes. All conduits to be clear of moisture and debris before wiring is commenced.

Unless otherwise specified in Part 2 of this specification or indicated on the service drawings, the wiring of the installation shall be carried out in accordance with the "Wiring Code". Further to the requirements concerning the installation of earth conductors to certain light points as set out in the "Wiring Code", it is a specific requirement of this document that where plain-end metallic conduit or non-metallic conduit has been used, earth conductors must be provided and drawn into the conduit with the main conductors to all points, including all luminaires and switches throughout the installation.

Wiring for lighting circuits is to be carried out with 1,5mm² conductors and a 1,5mm²-earth conductor. For socket outlet circuits the wiring shall comprise 4mm² conductors and a 2,5mm²-earth conductor. In certain instances, as will be directed in Part 2 of this

specification, the sizes of the aforementioned conductors may be increased for specified circuits. Sizes of conductors to be drawn into conduit in all other instances, such as feeders to distribution boards, power points etc., shall be as specified elsewhere in this specification or indicated on the drawings. Sizes of conductors not specified must be determined in accordance with the "Wiring Code".

The loop-in system shall be followed throughout, and no joints of any description will be permitted.

The wiring shall be done in PVC insulated 600/1000 V grade cable to SANS 1507.

Where cable ends connect onto switches, luminaires etc., the end strands must be neatly and tightly twisted together and firmly secured. Cutting away of wire strands of any cable will not be allowed.

13. SWITCHES AND SOCKET OUTLETS

All switches and switch-socket outlet combination units shall conform to the Department Quality Specifications, which form part of this specification.

No other than 16 A 3 pin sockets are to be used, unless other special purpose types are distinctly specified or shown on the drawings.

All light switches shall be installed at 1,4m above finished floor level and all socket outlets as directed in the Schedule of Fittings which forms part of this specification or alternatively the height of socket outlets may be indicated on the drawings.

14. SWITCHGEAR

Switchgear, which includes circuit breakers, iron-clad switches, interlocked switch-socket outlet units, contactors, time switches, etc., is to be in accordance with the Departmental Quality Specifications which form part of this specification and shall be equal and similar in quality to such brands as may be specified.

For uniform appearance of switchboards, only one approved make of each of the different classes of switchgear mentioned in the Quality Specifications shall be used throughout the installations.

15. SWITCHBOARDS

All boards shall be in accordance with the types as specified, be constructed according to the detail or type drawings and must be approved by the Employer before installation.

In all instances where provision is to be made on boards for the supply authority's main switch and/or metering equipment the contractor must ensure that all requirements of the authorities concerned in this respect are met.

Any construction or standard type aboard proposed, as an alternative to that specified must have the prior approval of the Employer.

All busbars, wiring, terminals, etc., are to be adequately insulated and all wiring is to enter the switchgear from the back of the board. The switchgear shall be mounted within the boards to give a flush front panel. Cable and boxes and other ancillary equipment must be provided where required.

Clearly engraved labels are to be mounted on or below every switch. The working of the labels in English, is to be according to the lay-out drawings or as directed by the Electrical Engineer and must be confirmed on site. Flush mounted boards to be installed with the top of the board 2,0m above the finished floor level.

16. WORKMANSHIP AND STAFF

Except in the case of electrical installations supplied by a single-phase electricity supply at the point of supply, an accredited person shall exercise general control over all electrical installation work being carried out.

The workmanship shall be of the highest grade and to the satisfaction of the Employer.

All inferior work shall, on indication by the Employer's inspecting officers, immediately be removed and rectified by and at the expense of the Contractor.

17. VERIFICATION AND CERTIFICATION OF ELECTRICAL INSTALLATION (CERTIFICATE OF COMPLIANCE AND TEST REPORT)

On completion of the service, a certificate of compliance must be issued to the Principal Agent/Electrical Engineer or Employer in terms of the Occupational Health and Safety Act, 1993 (Act 85 of 1993) in the format as set out in SANS 10142-1 & 2.

18. EARTHING OF INSTALLATION

Main earthing

The type of main earthing must be as required by the supply authority if other than the Employer, and in any event as directed by the Principal Agent/Electrical Engineer, who may require additional earthing to meet test standards.

Where required an earth mat shall be provided, the minimum size, unless otherwise specified, being 1,0m x 1,0m and consisting of 4mm diameter hard-drawn bare copper wires at 250mm centres, brazed at all intersections.

Alternatively, or additionally earth rods or trench earths may be required as specified or directed by the Electrical Engineer.

Installations shall be effectively earthed in accordance with the "Wiring Code" and to the requirements of the supply authority. All earth conductors shall be stranded copper with or without green PVC installation.

Connection from the main earth bar on the main board must be made to the cold water main, the incoming service earth conductor, if any and the earth mat or other local electrode by means of 12mm x 1,60 mm solid copper strapping or 16 mm² stranded (not solid) bare copper wire or such conductor as the Department's representative may direct. Main earth copper strapping where installed below 3m from ground level, must be run in 20 mm diameter conduit securely fixed to the walls.

All other hot and cold water pipes shall be connected with 12mm x 0,8mm perforated for solid copper strapping (not conductors) to the nearest switchboard. The strapping shall be fixed to the pipework with brass nuts and bolts and against walls with brass screws at 150-mm centres. In all cases where metal water pipes, down pipes, flues, etc., are positioned within 1,6m of switchboards an earth connection consisting of copper strapping shall be installed between the pipework and the board. In vertical building ducts accommodating both metal water pipes and electrical cables, all the pipes shall be earthed at each distribution board.

Roofs, gutters and down pipes

Where service connections consist of overhead conductors, all metal parts of roofs, gutters and down pipes shall be earthed. One bare 10mm² copper conductor shall be installed over the full length of the ceiling void, fixed to the top purlin and connected to the main earth conductor and each switchboard. The roof and gutters shall be connected at 15m intervals to this conductor by means of 12mm X 0,8mm copper strapping (not conductors) and galvanised bolts and nuts. Self-tapping screws are not

acceptable. Where service connections consist of underground supplies, the above requirements are not applicable.

Sub-distribution boards

A separate earth connection shall be supplied between the earth busbar in each sub-distribution board and the earth busbar in the Main Switchboard. These connections shall consist of a bare or insulated stranded copper conductors installed along the same routes as the supply cables or in the same conduit as the supply conductors. Alternatively armoured cables with earth continuity conductors included in the armouring may be utilised where specified or approved.

Sub-circuits

The earth conductors of fall sub-circuits shall be connected to the earth busbar in the supply board in accordance with SANS 10142.

Ring Mains

Common earth conductors may be used where various circuits are installed in the same wire way in accordance with SANS 10142. In such instances the sizes of earth conductors shall be equivalent to that of the largest current carrying conductor installed in the wire way, alternatively the size of the conductor shall be as directed by the Engineer. Earth conductors for individual circuits branching from the ring main shall by connected to the common earth conductor with T-ferrules or soldered. The common earth shall not be broken.

Non-metallic Conduit

Where non-metallic conduit is specified or allowed, the installation shall comply with the Department's standard quality specification for "conduit and conduit accessories".

Standard copper earth conductors shall be installed in the conduits and fixed securely to all metal appliances and equipment, including metal switch boxes, socket-outlet boxes, draw-boxes, switchboards, luminaires, etc. The securing of earth conductors by means of self-threading screws will not be permitted.

Flexible Conduit

An earth conductor shall be installed in all non-metals flexible conduit. This earth conductor shall not be installed externally to the flexible conduit but within the conduit with the other conductors. The earth conductor shall be connected to the earth terminals at both ends of the circuit.

Connection

Under no circumstances shall any connection points, bolts, screws, etc., used for earthing be utilised for any other purpose. It will be the responsibility of the Contractor to supply and fit earth terminals or clamps on equipment and materials that must be earthed where these are not provided.

Unless earth conductors are connected to proper terminals, the end shall be tinned and lugged.

19. MOUNTING AND POSITIONING OF LUMINAIRES

The Contractor is to note that in the case of board and acoustic tile ceilings, i.e. as opposed to concrete slabs, close co-operation with the building contractor is necessary to ensure that as far as possible the luminaires are symmetrically positioned with regard to the ceiling pattern.

The layout of the luminaires as indicated on the drawings must be adhered to as far as possible and must be confirmed with the Department's representative.

Fluorescent luminaires installed against concrete ceilings shall be screwed to the outlet boxes and in addition 2 x 6mm expansion or other approved type fixing bolts are to be provided. The bolts are to be ¾ of the length of the luminaires apart.

Fluorescent luminaires to be mounted on board ceilings shall be secured by means of two 40mm x No. 10 round head screws and washers. The luminaires shall also be bonded to the circuit conduit by means of locknuts and brass bushes. The fixing screws are to be placed ¾ of the length of the fitting apart.

Earth conductors must be drawn in with the circuit wiring and connected to the earthing terminal of all fluorescent luminaires as well as other luminaires exposed to the weather in accordance with the “Wiring Code”.

Incandescent luminaires are to be screwed directly to outlet boxes in concrete slabs. Against board ceilings the luminaires shall be secured to the brandering or joists by means of two 40mm x No. 8 round head screws.

PART 2: INSTALLATION DETAILS

1. CABLE SLEEVE PIPES

Where cables cross under roadways, other services and where cables enter buildings, the cables shall be installed in earthenware or high-density polyethylene pipes.

The ends of all sleeves shall be sealed with a non-hardening watertight compound after the installation of cables. All sleeves intended for future use shall likewise be sealed.

2. NOTICES

The Contractor shall issue all notices and make the necessary arrangements with Supply Authorities, the Postmaster-General, and S.A. Transport Services, Provincial or National Road Authorities and other authorities as may be required with respect to the installation.

3. ELECTRICAL EQUIPMENT

All equipment and fittings supplied must be in accordance with the attached quality specification (Part 3 of this document), suitable for the relevant supply voltage, and frequency and must be approved by the Employers Electrical Engineer.

4. DRAWINGS

The drawings generally show the scope and extent of the proposed work and shall not be held as showing every minute detail of the work to be executed.

The position of power points, switches and light points that may be influenced by built-in furniture must be established on site, prior to these items being built in.

5. BALANCING OF LOAD

The Contractor is required to balance the load as equally as possible over the multiphase supply.

6. SERVICE CONDITIONS

All plant shall be designed for the climatic conditions appertaining to the service.

7. SWITCHES AND SOCKET OUTLETS

The installation of switches and socket outlets must conform to clause 13 of Part 1 of this specification.

8. LIGHT FITTINGS AND LAMPS

The installation and mounting of luminaires must conform to clause 19 of Part 1 of this specification.

All fittings to be supplied by the Contractor shall have the approval of the Employer.

The light fittings must be of the type specified in the Schedule of Light Fittings.

9. EARTHING AND BONDING

The Contractor will be responsible for all earthing and bonding of the building and installation. The earthing and bonding is to be carried out strictly as described in clause 18 of Part 1 of this specification and to the satisfaction of the Employer/s Electrical Engineer.

10. MAINTENANCE OF ELECTRICAL SUPPLY

All interruptions of the electrical supply that may be necessary for the execution of the work, will be subject to prior arrangement between the Contractor and the Client and the Employer's Electrical Engineer.

11. EXTENT OF WORK

The work covered by this contract comprises the complete electrical installation, in working order, as shown on the drawings and as per this specification, including the supply and installation of all fittings, machines and other equipment.
The main components of the project are

11.1 Installation of a complete Solar system to supply the total load
11.2 Construction of a building to accommodate the solar machines and energy storage
11.3 Construction of the solar array structures
11.4 Relocation of the two existing generators to a new location under the solar arrays in new canopies
11.5 Construction of new fencing as indicated on drawings
11.6 Removal of old redundant fencing
11.7 Relocation of wet works to clear the site for installation of the solar arrays
11.8 Removal of vegetation including trees.

12. SUPPLY AND CONNECTION

The supply will be at 400/230 Volt 50Hz, as generated by the solar system and the standby generators

The Contractor will be responsible for the supply and installation of all cables as indicated on the drawings. The size and length of the cables are listed in the Schedule of Cables and measured in the Bills of Quantities.

13. CONDUIT AND WIRING

CONDUIT AND CONDUIT ACCESSORIES

13.1 STANDARD SPECIFICATIONS

13.1.1 DEPARTMENT OF PUBLIC WORKS STANDARD SPECIFICATIONS

PART B1 – Installation and termination of conduits and conduit accessories.

PART C1 – Conduit and Conduit Accessories.

13.1.2 NATIONAL/INTERNATIONAL SPECIFICATIONS

a.) Screwed metallic conduit and accessories: SANS 1065 parts 1 and 2.
b.) Plain-end metallic conduit and accessories: SANS 1065 Parts 1 and 2.

13.2 PROJECT SPECIFICATION

Conduit and conduit accessories shall be galvanized screwed conduit or /galvanized plain end conduit in accordance with SANS 61386.

All conduits, regardless of the system employed, shall be installed strictly as described in the applicable paragraphs of clauses 4 to 8 of Part 1 of the specification. Wiring of the installation shall be carried out as directed in clause 9 part 1 of this specification.

Where plain end conduit is offered all switches and light fittings must be supplied with a permanent earth terminal for the connection of the earth wire.

Lugs held by switch fixing screws or self-tapping screws will not be acceptable.

14. CABLE TRAYS AND LADDERS

14.1 STANDARD SPECIFICATIONS

14.1.1 DEPARTMENT OF PUBLIC WORKS STANDARD SPECIFICATIONS

PART B3 - Installation of cable trays and ladders
PART C3 - Cables trays and ladders.

14.1.2 NATIONAL/INTERNATIONAL SPECIFICATIONS

None.

14.2 PROJECT SPECIFICATION

Only galvanised steel cable trays and ladders and accessories will be accepted.

15. FIXING MATERIALS

15.1 STANDARD SPECIFICATIONS

15.1.1 DEPARTMENT OF PUBLIC WORKS STANDARD SPECIFICATIONS

PART B4 - Fixing materials.

15.1.2 NATIONAL/INTERNATIONAL SPECIFICATIONS

None.

15.2 PROJECT SPECIFICATION

All fixing materials to comply to Part B4 of the standard specifications

16. WIRING

16.1 STANDARD SPECIFICATIONS

16.1.1 DEPARTMENT OF PUBLIC WORKS STANDARD SPECIFICATIONS

PART B5 - Wiring.
PART C4 - PVC insulated cables 600/1000V grade
PART C9 - Wiring terminals.

16.1.2 NATIONAL/INTERNATIONAL SPECIFICATIONS

SANS 10142 - Wiring of Premises.

16.2 PROJECT SPECIFICATION

16.2.1 Wiring for all AC circuits must be done with PVC insulated single core conductors and earth wires.

16.2.2 Wiring for all DC circuits must be done with solar cable complying to the following specification:

17. CABLES

17.1 STANDARD SPECIFICATIONS

17.1.1 DEPARTMENT OF PUBLIC WORKS STANDARD SPECIFICATIONS

PART B6	-	Installation of cables.
PART C4	-	PVC insulated cable 600/1000V grade.
PART C5	-	Glands for PVC-insulated cables.
PART C6	-	Cable terminations and joints.

17.1.2 NATIONAL/INTERNATIONAL SPECIFICATIONS

SANS 10198- The selection, handling and installation of electric power cables of rating not exceeding 33kV

17.2 PROJECT SPECIFICATION

All cables must be PVC insulated, PVC covered, Steel Wire Armoured and PVC sheathed cable with copper conductors and a voltage gradient of 600/1000V.

The Contractor shall supply and completely install all distribution cables as indicated on the drawings and listed in the Schedule of Cables.

The storage, transportation, handling and laying of the cables shall be according to first class practice, and the contractor shall have adequate and suitable equipment and labour to ensure that no damage is done to cables during such operations.

The cable-trenches shall be excavated to a depth of 0,9m deep below ground level and shall be 450mm wide for one to three cables, and the width shall be increased where more than three cables are laid together so that the cables may be placed at least two cable diameters apart throughout the run. The bottom of the trench shall be level and clean and the bottom and sites free from rocks or stones liable to cause damage to the cable.

The Contractor must take all necessary precautions to prevent the trenching work being in any way a hazard to the personnel and public and to safeguard all structures, roads, sewage works or other property on the site from any risk of subsidence and damage.

In the trenches the cables shall be laid on a 75mm thick bed of earth and be covered with a 150-mm layer of earth before the trench is filled in.

All joints in underground cables and terminations shall be made either by means of compound filled boxes according to the best-established practice by competent cable jointers using first class materials or by means of approved epoxy-resin pressure type jointing kits. Epoxy-resign joints must be made entirely in accordance with the manufacturer's instructions and with materials stipulated in such instructions. Low tension PVCA cables are to be made off with sealing glands and materials designed for this purpose which must be of an approved make. Where cables are cut and not immediately made off, the ends are to be sealed without delay.

The laying of cables shall not be commenced until the trenches have been inspected and approved. The cable shall be removed from the drum in such a way that no twisting, tension or mechanical damage is caused and must be adequately supported at intervals during the whole operation. Particular care must be exercised where it is necessary to draw cables through pipes and ducts to avoid abrasion, elongation or distortion of any kind. The ends of such pipes and ducts shall be sealed to approval after drawing in of the cables.

Backfilling (after bedding) of the trenches is to be carried out with a proper grading of the material to ensure settling without voids, and the material is to be tamped down after the

addition of every 150mm. The surface is to be made good as required.

On each completed section of the laid and jointed cable, the insulation resistance shall be tested to approval with an approved "Megger" type instrument of not less that 500 V for low tension cables.

Earth continuity conductors are to be run with all underground cables constituting part of a low-tension distribution system. Such continuity conductors are to be stranded bare copper of a cross-sectional area equal to at least half that of one live conductor of the cable but shall not be less than 4mm² or more than 70mm². A single earth wire may be used as earth continuity conductor for two or more cables run together, branch earth wires being brazed on where required

18. LIGHT SWITCHES

18.1 STANDARD SPECIFICATIONS

18.1.1 DEPARTMENT OF PUBLIC WORKS STANDARD SPECIFICATIONS

PART B7 - Installation of light switches and socket outlets.
PART C10 - Light switches.
PART C39 - Standard Paint Specification

18.1.2 NATIONAL/INTERNATIONAL SPECIFICATIONS

SANS 10142 - Wiring of Premises

18.2 PROJECT SPECIFICATION

Only metal clad industrial type, surface mounted light switches must be used.

19. UNSWITCHED AND SWITCHED SOCKET OUTLETS

19.1 STANDARD SPECIFICATIONS

19.1.1 DEPARTMENT OF PUBLIC WORKS STANDARD SPECIFICATIONS

PART B7 - Installation of light switches and socket outlets
PART C11 - Unswitched and Switched Socket Outlets
PART C39 - Standard Paint Specification

19.1.2 NATIONAL/INTERNATIONAL SPECIFICATIONS

SANS 10142 - Wiring of Premises

19.2 PROJECT SPECIFICATION

Only metal clad industrial type, surface mounted socket outlets must be used

20. LIGHT LUMINAIRES

20.1 STANDARD SPECIFICATIONS

20.1.1 DEPARTMENT OF PUBLIC WORKS STANDARD SPECIFICATIONS

PART B.9 - Installation Of Luminaires
PART C12 - Luminaires for interior and exterior applications
PART C39 - Standard Paint Specification

20.1.2 **NATIONAL/INTERNATIONAL SPECIFICATIONS**

None.

20.2 **PROJECT SPECIFICATION**

Supply and install all light luminaires as per lighting schedule and drawings.

21. POWER POINTS

Allow for the installation of power points and equipment as listed in the schedule, indicated on the drawings and described below:

21.1 Air Conditioners

21.2 Water heaters
[The power points required for the service must be specified in detail with reference to supplier of the equipment, method of installation and final connection. The size of the conduit/the conductors and cable must be listed in the Schedule of Power Points.]
The Contractor must electrically connect all water heaters and Air Conditioners as specified and listed in the Schedule of Power Points.
The hot water installation must be approved by the Employers Electrical Engineer. Detail with regard to the size and type of water heaters that must be provided must be obtained from the Engineer

22. FIXED WATER STORAGE HEATERS

22.1 **STANDARD SPECIFICATIONS**

22.1.1 **DEPARTMENT OF PUBLIC WORKS STANDARD SPECIFICATIONS**

PART C13 - Fixed water storage heaters

22.1.2 **NATIONAL/INTERNATIONAL SPECIFICATIONS**

None.

22.2 **PROJECT SPECIFICATION**

Replace all existing element type water heaters with Inverter type 3.8kW (heating Capacity) water heaters. The unit must include a timer to program operating times.

23. SWITCHBOARDS (DISTRIBUTION BOARDS) (UP TO 1KV).

23.1 **STANDARD SPECIFICATIONS**

23.1.1 **DEPARTMENT OF PUBLIC WORKS STANDARD SPECIFICATIONS**

PART C17 - SWITCHBOARDS (UP TO 1kv).

23.1.2 **NATIONAL/INTERNATIONAL SPECIFICATIONS**

SANS 1-0142 - Wiring of Premises

23.2 **PROJECT SPECIFICATION**

Supply and install all Switchboards (DB's) as per Part C17 of the standard specifications and as per Schematic diagrams and schedules in this tender document.

In addition to clause 14 and clause 15 of Part 1 of this specification the following shall also be applicable to switchboards required for this service.

The Contractor shall supply and install the distribution boards as indicated on the drawings and listed in the distribution Board Schedule. All distribution boards shall comply with the quality specification in Part 3 of this specification and be approved by the Employer's Electrical Engineer.

The following types of distribution boards are required for the service:

DB-M Energy Storage and Equipment Room surface Mounted

24. LOW VOLTAGE DISTRIBUTION CUBICLES (KIOSKS)

24.1 STANDARD SPECIFICATIONS

24.1.1 DEPARTMENT OF PUBLIC WORKS STANDARD SPECIFICATIONS

PART C18 - Low Voltage Distribution Cubicles (Kiosks)

24.1.2 NATIONAL/INTERNATIONAL SPECIFICATIONS

None.

24.2 PROJECT SPECIFICATION

Supply and install all Low Voltage Distribution Cubicles (Kiosks) as per Part C18 of the standard specifications and as per Schematic diagrams and schedules in this tender document.

Kiosk K3	Site	Plinth Mounted
Kiosk K3	Site	Plinth Mounted

25. EARTHING ELECTRODES

25.1 STANDARD SPECIFICATIONS

25.1.1 DEPARTMENT OF PUBLIC WORKS STANDARD SPECIFICATIONS

PART B11 - Earthing
PART C16 - Earthing Electrodes

25.1.1 NATIONAL/INTERNATIONAL SPECIFICATIONS

SANS 1-0142 - Wiring of Premises

25.2 PROJECT SPECIFICATION

Earth all structures in accordance with the standard specifications and SANS 1-0142.

26. FLOOD LIGHTS (SECURITY LIGHTS)

26.1 STANDARD SPECIFICATIONS

26.1.1 DEPARTMENT OF PUBLIC WORKS STANDARD SPECIFICATIONS

PART C12.8 - Floodlight luminaires

26.1.2 NATIONAL/INTERNATIONAL SPECIFICATIONS

None.

26.2 **PROJECT SPECIFICATION**

Supply and install all Security light luminaires on Security fence as per lighting schedule and drawings.

27. BACK-UP GENERATORS

27.1 **STANDARD SPECIFICATIONS**

27.1.1 **DEPARTMENT OF PUBLIC WORKS STANDARD SPECIFICATIONS**

Specification For the Supply, Installation and Commissioning Of An Outdoor Emergency Generator Set (Date: May 2020).

27.1.2 **NATIONAL/INTERNATIONAL SPECIFICATIONS**

None.

27.2 **PROJECT SPECIFICATION**

27.2.1 Remove the two existing machines from site and transport to workshop
27.2.2 Manufacture a new soundproof and weatherproof canopy, base frame, 1000l fuel tank and install machine in the canopy
27.2.3 Manufacture and install a new auto start panel, PLC controlled generator controller
27.2.4 Supply a remote monitor for alarms and other essential parameters of the generator and alternator.
27.2.5 Manufacture and install a new Selector DB, to automatically or manually select one of
27.2.6 Deliver machines to site and commission and perform all tests
Note that the two machines cannot be removed simultaneously, as one must always be available on site

28. SCHEDULE OF LIGHT FITTINGS

SYMBOL	DESCRIPTION	REMARKS	QTY
A	The luminaire consists of an injection-moulded, flam e retardant poly carbonate housing and prismatic diffuser. The powder coated white reflector and control gear tray, upon which all electrical components are mounted, are secured by means of multiple twist lock latches to secure the reflector to the housing. The silicone sponge seal is moulded into the housing to ensure an optimal seal between the housing and the prismatic diffuser. Two of the stainless-steel latches facilitate the hinging of the diffuser and ensure correct alignment when closing the diffuser. It must be designed to operate 40W LEDs. The light fitting must in general comply with the department's specification for tubular fluorescent luminaires for interior application.	The luminaire shall bear the SABS mark SANS 60598 and SANS 1464-22. The luminaire shall be IP65 with a light colour of 4000k. The control gear shall be constant current driver (LED) ECG (fl) with 10kV surge protection. The luminaire will be 230V AC rated.	
B	The linear luminaire base and trim	The luminaire shall bear the	

	ring is manufactured of a high-pressure die-cast aluminium (EN 1706 AC-44300). The trim ring casing is mounted onto the base casing by means of stainless steel M5 Allen head screws, located outside the lamp compartment. The base and trim are finished with epoxy powder coating. An opal non-discolouring high impact injection moulded diffuser is used throughout the range. It shall offer excellent vandal resistance, be highly translucent and shall not discolour even when subjected to the harshest UV environments. A silicone sponge gasket shall be fitted into a special groove in the diffuser to prevent damage to the gasket during installation and to achieve the certified ingress protection rating of IP65. All interconnecting wiring is Teflon insulated. It shall be designed to operate LEDs of up to 20W. the light fitting must in general comply with the department's specification for bulkhead luminaires for interior and exterior application.	SABS mark SANS 60598 and SANS 1464-22. The luminaire shall be IP65 with a light colour of 4000k. The control gear shall be constant current driver (LED) ECG (fl) with 10kV surge protection. The luminaire will be 230V AC rated.	
C	The pole mounted luminaire designed for optimized perimeter lighting. luminaire consists of a spigot base compartment and hinged led engine top casing. The hinged design allows the easy installation of the led engine and the stainless-steel latches allows for easy closure achieving the IP65 water ingress protection of the electronic components. The design can operate LEDs up to 53W. the luminaire shall be supplied and installed with 6m mounting height (6.9 overall length). The light fitting must in general comply with the department's specification for security luminaires for prison application and the pole with the department's standard specification for fibre glass reinforced polyester lighting poles.	The luminaire shall bear the SANS 475 performance mark and the SANS 60598-2-3 safety mark. The luminaire shall have a degree of protection that complies with SANS 60598-2-3. LED compartment: IP66 The IP rating is supported by a certified test report.	

29. SCHEDULE OF POWER POINTS

BOARD	POWER POINT	TYPE	SIZE OF CABLES, CONDUIT AND WIRING	LOAD WATTS
MDB	PP1	150 liter	20mm dia. conduit with 2 x 4mm² conductors and 2,5mm² earth wire	3000
	PP2	4 plate electric stove	25 mm dia. conduit with 2 x 10mm² conductors and 6mm² earth wire	9000
DB-A	PP3	350 liter	25 mm dia. conduit with 4 x	3 x 3000

		water heater	4mm² conductors and 2,5mm earth wire	
DB-C	PP1	Petrol pump	4mm² 2-core PVCA cable with 4mm² earth wire	1000

30. SCHEDULE OF CABLES, CONDUIT AND WIRING

Supply, install and connect the following cable, conduit and wiring:

FROM	TO	SIZE AND TYPE	LOAD (kVA)
Meter box Normal Power	MDB	70mm² 4-core PVCA cable and 35mm² earth wire	114
MDB Normal Power	DB-A	25mm² 4-core PVCA cable and 16mm² earth wire	50
MDB Normal Power	DB-B	16mm² 4-core PVCA cable and 10mm² earth wire	36
MDB Normal Power	DB-X	25mm dia. conduit with 4 x 6mm² conductors and 4mm² earth wire	10
DB-X Standby Power	MDB	25mm dia. conduit with 4 x 6mm² conductors and 4mm² earth wire	-
MDB Standby Power	DB-C	4mm² 4-core PVCA cable and 4mm² earth wire	7
DB-C Standby Power	PP1	4mm² 4-core PVCA cable and 4mm² earth wire	1

31. SCHEDULE OF DISTRIBUTION BOARDS AND KIOSKS

The front panels of normal supply, standby power and no-break supply sections shall be painted in distinctive colours as follows:

Normal supply - Light Orange, colour B26 of SANS 1091.

Indicated is the probable fault level rating (kA) of the busbars. Refer to the Summary of Switchgear and Circuits for the minimum fault level rating of specified equipment.

BOARD	TYPE	PANEL	FAULT LEVEL	LOAD kVA
DB-M	Surface mounted, with doors	Power conversion equipment	5	150
K-3	Plinth mounted weatherproof kiosk	Power conversion equipment	5	120
K-4	Plinth mounted weatherproof kiosk	Power conversion equipment	5	50

32. SUMMARY OF SWITCHGEAR AND CIRCUITS

The indicated fault current rating (kA) is the minimum value that the switchgear must comply with for connecting to the busbars of the respective panels-distribution boards.

MAIN DISTRIBUTION BOARD : DB-M

Main switch	:	250A three pole 10kA circuit breaker.
Kiosk K1	:	150A three pole 5kA circuit breaker.
Kiosk K3	:	175A three pole 5kA circuit breaker
Lighting circuits 1-2	:	2 x 20A single pole 5kA circuit breaker.
Socket outlet circuit P1	:	60A two pole 30mA single phase earth leakage relay, and 1 x 20A single pole 5kA

		circuit breaker
Air Conditioner circuits AC1-AC3	:	3 x 20A single pole 5kA circuit breaker.
Sewerage package plant	:	1 x 80 three pole 5kA circuit breaker and kWh energy meter**.**
Open positions	:	12 x single pole and 3 x three pole circuit breakers
Lightning arresters	:	set of three
KIOSK K3		
Main switch	:	250A three pole isolator
Connection of existing cables	:	1 x 150A three pole 5kA circuit breakers 2 x 40A three pole 5kA circuit breakers 2 x 30A single pole 5kA circuit breakers
Kiosk K4	:	1 x 80A three pole 5kA circuit breaker
Open positions	:	9 x three pole circuit breakers
Lightning arresters	:	set of three
KIOSK K4		
Main switch	:	80A three pole isolator
Sewer Pumps (2)	:	2 x 300A three pole 5kA circuit breakers
Open positions	:	9 x three pole circuit breakers
Lightning arresters	:	set of three

PART 3: QUALITY SPECIFICATION FOR MATERIALS AND EQUIPMENT OF ELECTRICAL INSTALLATIONS

"Part 3: Quality specification for materials and equipment" manual of the Department of Public Works is applicable for this Contract and the manual can be obtained from the Department of Public Works.

ADDITIONAL REQUIREMENTS OR SPECIFICATIONS NOT COVERED IN QUALITY SPECIFICATIONS ABOVE

LED LIGHTS

All Light fittings installed for this project is to be of the LED type, unless otherwise stated.

The following international standard specifications and South-African Bureau of Standards shall apply to the LED luminaire specification:

SANS 475	Luminaires for interior lighting, street lighting and floodlighting – Performan and requirements
SANS 10114-1	Interior lighting part 1: Artificial lighting of interiors
SANS 10114-2	Interior lighting part 2: Emergency lighting
SANS 60598-1	Luminaires part 1: General requirements and tests
SANS 60598-2.1	Luminaires part 2: Particular requirements section 1 – Fixed general purpo luminaires.
SANS 60598-2.2	Luminaires part 2: Particular requirements section 2 – Recessed luminaires
SANS 60598-2.3	Luminaires part 2: Particular requirements section 3 – Luminaires for road a street lighting.
SANS 60598-2.5	Luminaires part 2: Particular requirements section 5 – Flood lighting.
SANS 61347-1 to 13	Lamp control gear
SANS 62031	LED modules for general lighting – Safety specifications
SANS 62384	DC or AC supplied electronic control gear for LED modules – Performance requirements.
SANS 62560	Self-ballasted LED lamps for general lighting services with supply voltages 50V – Safety specification.
SANS 62612	Self-ballasted LED lamps for general lighting services with supply voltages 50V – Performance requirements
EN 55015	Limits and methods of measurement of radio disturbance of electrical lighti or equipment.
EN 61000-3.2	Electromagnetic compatibility (EMC) limits for harmonic current emissions.
EN 61000-3.3	Electromagnetic compatibility (EMC) limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems.
EN 61547	Equipment for general lighting purposes: EMC immunity requirements.
IEC-EN 62471	Photo biological safety of lamps and lamp systems for LEDs
IES LM-79-08	Approved method: Electrical and photometric measurement of solid-state lighting products.
IES LM-80	Approved method: Measuring lumen maintenance of LED light sources.

<u>General requirements:</u>

The luminaire shall be suitable for operation with mid-power LEDs. **Note that no LED tubes are allowed to be used.**

The luminaire shall be suitable for operation on a 230V single phase 50Hz mains supply.

Power factor capacitors shall be supplied to correct the power factor to at least 0.95 of higher.

The luminaire shall be marked with identification labels stating the brand name and model and shall bear the SANS approval mark.

The driver shall comply with IEC 61347-1 and IEC 61347-2B as applicable and shall be suitable for operation on 230V +-10%, 50Hz single phase system and it must be insured that harmonics filter is provided as per SANS 61000-3-2. The drivers and LED circuitry shall be protected against lighting and power surges. Suitable surge arrestors with a 10kA rating shall be provided for indoor installations and 20kA for outdoor installations.

Colour rendering (Ra) shall be not less than 80 and lumen depreciation of not more than 30% L70 at 50 000 hours @ Tq 25°C. Colour temperature of the LED lamp shall be 4000K, unless otherwise stated.

Thermal requirements:

The luminaire must be able to withstand an ambient temperature of 35°C. Storage temperature of this luminaire should be able to handle -40°C < T < 60°C.

To this end internal electrical and mechanical components shall not be allowed to exceed their maximum temperature ratings of 75°C. Test reports from an independent authorised testing facility proving this requirement shall be made available on request.

Noise requirements:

The noise level emitted from the luminaire shall be kept as low as possible. Drivers/electronic components shall therefore fully comply with the latest edition of SANS 55015.

PART 4: BILLS OF QUANTITIES

Bills of Quantities are included in part C2.2 of the tender document.

PART 5: ELECTRICAL WORK MATERIAL SCHEDULE

The Contractor shall complete the following schedules and submit them to the Electrical Engineer within 21 days of the date of the acceptance of the tender.

The schedules will be scrutinised by the Electrical Engineer and should any material offered not comply with the requirements contained in the specification, the Contractor will be required to supply material in accordance with the contract at no additional cost.

NB: Only one manufacturer's name to be inserted for each item.

ITEM	MATERIAL	MAKE OR TRADE NAME	COUNTRY OF ORIGIN
1.	Distribution boards		
2.	Circuit breakers 1P, 2P, 3P		
3.	On load isolators without trips		
4.	Contactors 1P, 2P, 3P		
5.	Earth leakage relays 1 & 3 phase		
6.	H.R.C. fuse switches		
7.	Kilowatt hour meter		
8.	Current transformers		
9.	Voltmeter		
10.	Maximum demand ammeter		
11.	Daylight sensitive switch		
12.	Time switch		
13.	Conduit		
14.	Conduit boxes		
15.	Power skirting		
16.	Surface switches		
17.	Watertight switches		
18.	16A flush socket outlets		
19.	16A surface socket outlets		
20.	16A watertight socket outlets		
21.	Fluorescent luminaires Type A		
22.	Bulkhead fittings: Type B		
23.	Spherical fittings: Type C		
24.	4 plate stove		
25	PVCA cable		
26.	Cable trays		

PART 6: DRAWINGS

Architectural and Electrical Engineering Services:

NO.	DESCRIPTION	DRAWING NO.
1	List of drawings	10492/00/A5
2	Architectural: Energy storage & equipment room - Position and site information	10492/01/A6
3	Architectural: Energy storage & equipment room - Floor plans, sections and details	10492/02/A6
4	Architectural: Energy storage & equipment room - Floor plans, elevations and details	10492/03/A6
5	Electrical: Site plan - Existing electrical reticulation	EE10492/01-01/A1
6	Electrical: Site plan - Alterations to existing electrical reticulation	EE10492/01-02/A4
7	Electrical: Site plan - Solar array site lv cable reticulation	EE10492/01-03/A4
8	Electrical: Site plan - Solar array site security light layout	EE10492/01-04/A4
9	Electrical: Energy storage & equipment room - Electrical installation	EE10492/100-01/A4
10	Electrical: Energy storage & equipment room - Equipment layout	Omitted
11	Electrical: Schematic diagrams	EE10492/200-01/A3
12	Electrical: Site plan - 3m High inner security fence	EE10492/250-01/A4
13	Electrical: Site plan - 3m High dangerous game fence	EE10492/250-02/A3
14	Electrical: 3m High inner security fence & gate 1 detail - Sheet 1	EE10492/250-03/A1
15	Electrical: 3m High inner security fence & gate 2 detail - Sheet 2	EE10492/250-04/A1
16	Electrical: 3m High inner security fence & gate construction details	EE10492/250-05/A1
17	Electrical: 3m High dangerous game fence construction details	EE10492/250-06/A1

Mechanical Engineering Services (Part of Electrical work)

NO.	DESCRIPTION	DRAWING NO.
1	List of drawings	ME10492/00/01/A2
2	Mechanical: Energy storage & equipment room - Ventilation details	ME10492/ACV/01/A5
3	Fire: Energy storage & equipment room - Fire signage & protection	ME10492/FPE/01/A2

C3.5.3.3 BUILDING WORKS

3.5.3.3 Building works

The specification for the building works is covered in the Bill of Quantities for Building work and includes:

i). The building to house the energy storage equipment.
ii). New “Dangerous animal” fence.
iii). New security fence.
iv). All structure work.
v). Site works.

WET WORKS (CIVIL)

WET WORKS CONTENT **Page**

WET WORKS (CIVIL)

C3.3 PARTICULAR SPECIFICATIONS

3.5.1 GENERAL

1. SCOPE OF CONTRACT

The project covers the relocation of identified wet services i.e. water reticulation and sewer reticulation inclusive of decommissioning the existing septic tanks, as well as to ensure that the existing wet services are compliant with statutory regulations and meet the demands of the site by installing a containerised sewage treatment package plant.

The relocation of wet services, decommissioning of septic tanks, installation and commissioning of containerised sewage treatment plant are not limited to the following:

a) Delivery, Installation, testing and commissioning of 150m³/day Containerised sewage treatment plant.
b) Re-routing of existing sewer
c) Sewer pumping main.
d) Re-routing existing Water reticulation system
e) Relocation of park home
f) Decommissioning of septic tanks
g) Construction of sump pump station and accessories
h) Fencing of pump station
i) Installation of irrigation system
j) Building of 5000 litre tank stands

PS-4 CONSTRUCTION AND MANAGEMENT REQUIREMENTS

PS-4.1 General

The Contractor is referred to SANS 1921: 2004: Construction and Management Requirements for Works Contracts, Part 1: General Engineering and Construction Works, and Part 2: Accommodation of Traffic on Public Roads. These specifications shall be applicable to the contract under consideration and the Contractor shall comply with all requirements relevant to the project.

PS-4.2 Quality Assurance (QA) (Read with SANS 1921 – 1: 2004 clause 4.4)

The Contractor will be solely responsible for the production of work that complies with the Specifications to the satisfaction of the Engineer. To this end it will be the full responsibility of the Contractor to institute an appropriate Quality Assurance (QA) system on site. The Engineer will audit the Contractor's quality assurance (QA) system on a regular basis to verify that adequate independent checks and tests are being carried out and to ensure that the Contractor's own control is sufficient to identify any possible quality problems which could cause a delay or failure.

The Contractor shall ensure that efficient supervisory staff, the required transport, instruments, equipment and tools are available to control the quality of his own workmanship in accordance with his QA-system. His attention is drawn to the fact that it is not the duty of the Engineer or the Engineer's representative to act as foreman or surveyor.

PS-4.3 Management and disposal of water (Read with SANS 1921 - 1 : 2004 clause 4.6)

The Contractor shall pay special attention to the management and disposal of water and stormwater on the site. It is essential that all completed works or parts thereof are kept dry and properly drained. Claims for delay and for repair of damage caused to the works as a result of the Contractor's failure to properly manage rain and surface water, will not be considered.

PS-4.4 Disposal of spoil or surplus material (Read with SANS 1921 - 1 : 2004 clause 4.10)

The Contractor shall dispose all surplus and unsuitable material in legal spoil areas of his own choice. He shall be responsible for all arrangements necessary to obtain such spoil sites.

PS-4.5 Testing (Read with SANS 1921 – 1 : 2004 clause 4.11)

PS-4.5.2 Acceptance control

The process control test results submitted by the Contractor for approval of materials and workmanship may be used by the Engineer for acceptance control. However, before accepting any work, the Engineer may have further control tests carried out by a laboratory of his choice. The cost of such additional tests will be covered by a provisional sum provided in the schedule of quantities, but tests that failed to confirm compliance with the specifications, will be for the account of the Contractor.

PS-4.6 Survey beacons (Read with SANS 1921 - 1 : 2004 clause 4.15)

The Contractor shall take special precautions to protect all permanent survey beacons or pegs such as bench-marks, stand boundary pegs and trigonometrical beacons, regardless whether such beacons or pegs were placed before or during the execution of the Contract. If any such beacons or pegs have been disturbed by the Contractor or his employees, the Contractor shall have them replaced by a registered land surveyor at his own cost.

PS-4.7 Existing Services (Read with SANS 1921 - 1 : 2004 clause 4.17)

The Contractor shall make himself acquainted with the position of all existing services before any excavation or other work likely to affect the existing services is commenced.
The Contractor will be held responsible for any damage to known existing services caused by or arising out of his operations and any damage shall be made good at his own expense. Damage to unknown services shall be repaired as soon as possible and liability shall be determined on site when such damage should occur.

PS-4.8 Management of the environment (Read with SANS 1921 - 1 : 2004 clause 4.19)

The Contractor shall pay special attention to the following:

(a) Natural Vegetation

The Contractor shall confine his operation to as small an area of the site as may be practical for the purpose of constructing the works.

Only those trees and shrubs directly affected by the works and such others as the Engineer may direct in writing shall be cut down and stumped. The natural vegetation, grassing and other plants shall not be disturbed other than in areas where it is essential for the execution of the work or where directed by the Engineer.

(b) Fires

The Contractor shall comply with the statutory and local fire regulations. He shall also take all necessary precautions to prevent any fires. In the event of fire the Contractor shall take active

steps to limit and extinguish the fire and shall accept full responsibility for damages and claims resulting from such fires which may have been caused by him or his employees.

PS-5.9 Overhaul

No payment will be made for overhaul on this contract unless provision is made therefore in specific items.

PS-5.10 Security

The Contractor shall provide security watchmen for the contract as he deems fit at no extra cost for the Employer. The Contractor must ensure that all his employees as well as the employees of his subcontractors are able to identify themselves as members of the construction team.

PS-5 CONSTRUCTION PROGRAMME

PS-5.1 Preliminary programme

The Contractor shall include with his tender a preliminary programme on the prescribed form to be completed by all Tenderers. The programme shall be in the form of a simplified bar chart with sufficient details to show clearly how the works will be performed within the time for completion as stated in the Contract Data.

Tenderers may submit tenders for an alternative Time for Completion in addition to a tender based on the specified Time for Completion. Each such alternative tender shall include a preliminary programme similar to the programme above for the execution of the works and shall motivate his proposal clearly by stating all the financial implications of the alternative completion time.

The Contractor shall be deemed to have allowed fully in his tendered rates and prices as well as in his programme for all possible delays due to normal adverse weather conditions and special non-working days as specified in the Special Conditions of Contract, in the Project Specifications and in the Contract Data.

PS-5.2 Programme in terms of Clause 12 of the General Conditions of Contract

It is essential that the construction programme, which shall conform in all respects to Clause 5.6 of the General Conditions of Contract 2015, be furnished within the time stated in the Contract Data. The preliminary programme to be submitted with the tender shall be used as basis for this programme.

PS-7 SITE FACILITIES REQUIRED

PS7.1 Contractor's camp site and depot (Read with SANS 1921 - 1: 2004 clause 4.14)

The Contractor is responsible to provide a suitable site for his camp and to provide off-site accommodation for his personnel and labourers. A specific site shall be indicated to tenderers at the compulsory site inspection.

PS -7.2 Power supply, water and other services

The existing site is powered by diesel generators and there are no grid electrical services running on site. The Contractor shall make his own arrangements concerning the supply of electrical power, water and all other services. No direct payment will be made for the provision of electricity, water and other services. The cost thereof shall be deemed to be included in the rates and amounts tendered for the various items of work for which these services are required, or in the Contractor's preliminary and general items as the case may be.

PS-7.3 Temporary offices

The Engineer will not require a separate office and the Engineer's representative shall share the Contractor's facilities for meetings and discussions.

PS-8 REQUIREMENTS FOR ACCOMMODATION OF TRAFFIC

PS-8.1 General

The Contractor will be responsible for the safe and easy passage of public traffic past and on sections of roads of which he has occupation or where work has to be done near traffic.

Accommodation of traffic, where applicable shall comply with SANS 1921-2: 2004: Construction and Management Requirements for Works Contracts, Part 2: Accommodation of Traffic on Public Roads occupied by the Contractor. The Contractor shall obtain this specification from Standards South Africa if accommodation of traffic will be involved on any part of the construction works.

PS-9 OCCUPATIONAL HEALTH AND SAFETY

PS-9.1 General statement

It is a requirement of this contract that the Contractor shall provide a safe and healthy working environment and to direct all his activities in such a manner that his employees and any other persons, who may be directly affected by his activities, are not exposed to hazards to their health and safety. To this end the Contractor shall assume full responsibility to conform to all the provisions of the Occupational Health and Safety Act No 85 and Amendment Act No 181 of 1993, and the OHSA 1993 Construction Regulations 2003 issued on 18 July 2003 by the Department of Labour.

For the purpose of this contract the Contractor is required to confirm his status as mandatory and employer in his own right for the execution of the contract by entering into an agreement with the Employer in terms of the Occupational Health and Safety Act by executing the Agreement form C1.2.4 included in Section C1: Agreements and Contract Data.

PS-9.2 Health and Safety Specifications and Plans to be submitted at tender stage

(a) Employer's Health and Safety Specification

The Employer's Health and Safety Specification will be included in the tender documents as part of the Project Specifications.

(b) Tenderer's Health and Safety Plan

The successful Tenderer shall, on receipt of notification that he has been awarded the contract, submit without delay his own documented Health and Safety Plan for the execution of the work under the contract. His Health and Safety Plan must at least cover the following:

(i) a proper risk assessment of the works, risk items, work methods and procedures in terms of Regulations 7 to 28;
(ii) pro-active identification of potential hazards and unsafe working conditions;
(iii) provision of a safe working environment and equipment;
(iv) statements of methods to ensure the health and safety of subcontractors, employees and visitors to the site, including safety training in hazards and risk areas (Regulation 5);
(v) monitoring health and safety on the site of works on a regular basis, and keeping of records and registers as provided for in the Construction Regulations;

(vi) details of the Construction Supervisor, the Construction Safety Officers, and other competent persons he intends to appoint for the construction works in terms of Regulation 6 and other applicable regulations; and
(vii) details of methods to ensure that his Health and Safety Plan is carried out effectively in accordance with the Construction Regulations 2003.

The Contractor's Health and Safety Plan will be subject to approval by the Employer, or amendment, if necessary, before commencement of construction work. The Contractor will not be allowed to commence work, or his work will be suspended if he had already commenced work before he has obtained the Employer's written approval of his Health and Safety Plan.

Time lost due to delayed commencement or suspension of the work as a result of the Contractor's failure to obtain approval for his safety plan, shall not be used as a reason to claim for extension of time or standing time and related costs

PS-9.3 Cost of compliance with the OHSA Construction Regulations

The rates and prices tendered by the Contractor shall be deemed to include all costs for conforming to the requirements of the Act, the Construction Regulations and the Employer's Health and Safety Specification as applicable to this contract. Should the Contractor fail to comply with the provisions of the Construction Regulations, he will be liable for penalties as provided in the Construction Regulations and in the Employer's Health and Safety Specification.

Items that may qualify for remuneration will be specified in the Safety Specifications included or in the Project specifications.

PS-10.4 Potential site risks

- Exposure to Raw sewage
- Unstable excavations
- Exposure to possible injuries due to mishandling or failure of power tools and hand tools.
- Potentially dangerous existing services i.e. electrical high voltage cables.
- Electrical Components (exposed)
- Working most of the time in a restricted environment with limited landings (working platforms)
- Lifting and lowering materials and equipment from higher platform to lower platform and vice versa, exposed to cross winds.
- Non-conformance to specifications with regard s to fasteners and materials.
- Risk related to general safety and security on site.

Additional risks may arise from specific methods of construction selected by the contractor which are not necessarily covered in the above.

PS-10 ADVERSE WEATHER CONDITIONS

Should abnormal climatic conditions cause a delay, the circumstances will be evaluated as they arise, taking into consideration any normal rainfall conditions that could have been expected and for which the Tenderer should have made provision in his programming of the works.

The numbers of days per month on which work is expected not to be possible as a result of normal rainfall for which the Contractor shall make provision, is given in Table PS-10.1. In his tendered rates, prices and programme the Contractor shall allow at least for the number of lost working days listed for each month. Only the number of days lost as a result of adverse weather conditions exceeding the number of days listed in table PS-11.1 will qualify for consideration of extension of time.

- *Accurate rain measurements shall be taken at suitable points (or point) on site and the contractor shall at his own expense provide the rain gauges and take all necessary precautions to ensure that the rain gauges cannot be tampered with by unauthorised persons.*

During the execution of the Works, the Engineer's Representative will certify a day lost due to abnormal rainfall and adverse weather conditions only:

- if no work was possible on the relevant working day on any item which is on the critical path according to the latest approved construction programme; or

- if less than 30% of the work force and plant on Site could work during that specific working day.

Extension of time as a result of abnormal rainfall and adverse weather conditions shall be calculated monthly being equal to the number of working days certified by the Engineer's Representative as lost due to rainfall and adverse weather conditions, less the number of days allowed for as in Table PS-10.1, which could result in a negative figure for certain months. The total extension of time as a result of abnormal climatic conditions for which the Contractor may apply, shall be the cumulative algebraic sum of the monthly extensions. Should the sum thus obtained be negative, the extension of time shall be taken as nil."

TABLE PS-10.1: EXPECTED NUMBER OF WORKING DAYS LOST PER MONTH DUE TO NORMAL RAINFALL

MONTH	LOST WORKING DAYS ALLOWED
JANUARY	2
FEBRUARY	1
MARCH	0
APRIL	0
MAY	0
JUNE	0
JULY	0
AUGUST	0
SEPTEMBER	0
OCTOBER	0
NOVEMBER	1
DECEMBER	2

C3.4 STANDARD SPECIFICATIONS:

South African Bureau of Standards, Standardized Specifications for Civil Engineering Construction. SABS/SANS 1200 series, specifically:

- SANS 1200 A - General
- SANS 1200 AB - Engineers Office
- SANS 1200 C - Site Clearance
- SANS 1200 D - Earthworks
- SANS 1200 DA - Earthworks (Small Works)
- SANS 1200 DB - Earthworks (Pipe trenches)
- SANS 1200 DE - Small Dams
- SANS 1200 DM - Earthworks (Roads, Subgrade)
- SANS 1200 G - Concrete
- SANS 1200 HA - Structural Steelwork (Sundry Items)
- SANS 1200 HC - Corrosion Protection of Structural Steelwork
- SANS 1200 L - Medium Pressure Pipelines
- SANS 1200 LB - Bedding

B: AMENDMENTS TO THE STANDARD AND PARTICULAR SPECIFICATIONS

INTRODUCTION

In certain clauses the standard, standardized and particular specifications allow a choice to be specified in the project specifications between alternative materials or methods of construction and for additional requirements to be specified to suit a particular contract. Details of such alternative or additional requirements applicable to this contract are contained in this part of the project specifications. It also contains additional specifications required for this particular contract.

The number of each clause and each payment item in this part of the project specifications consists of the prefix PS followed by a number corresponding to the number of the relevant clause or payment item in the standard specifications. The number of a new clause or payment item, which does not form part of a clause or a payment item in the standard specifications and which is included here, is also prefixed by PS, but followed by a new number which follows on the last clause or item number used in the relevant section of the standard specifications.

PSA GENERAL

PSA-2 INTERPRETATION

PSA-2.2 Applicable edition of standards

PSA 3 MATERIALS

PSA 3.1 Quality

Where there is a standardisation mark programme for any material, all such material supplied shall bear the official standardisation mark.

Alternative materials or equipment proposed by the Contractor shall be tested. The test, as well as the materials or equipment, shall be approved by the Engineer prior to any such materials or equipment being built into the Works and all costs involved in testing shall be deemed to be included in the rates tendered.

PSA-5 CONSTRUCTION

PSA-5.1 Survey

PSA-5.1.1 Setting out of the Works

For any new work the Contractor shall establish his own reference lines from which the work can be set out.

PSA-5.5 Dealing with water on works

- **Replace with the following:**

PSA-5.5.1 "Flood, Seepage and Stormwater

The Contractor shall accept all risks for any water affecting the works during the construction period, whatever the source or cause may be, and shall properly deal with and dispose of all water to ensure that the works are kept sufficiently dry at all times for their proper execution. For this purpose he shall provide, operate and maintain in sufficient quantity such pumping equipment, well points, pipes and other equipment as may be necessary, and he shall also provide any sumps, furrows, cofferdams or other temporary works as may be necessary to minimize damage, inconvenience or interference.

PSA-5.5.2 Water for Construction Purposes

All water used for the Works shall be of adequate quality for the purposes required and, in the assessment of the quality, the Engineer's decision will be final. The Contractor shall make his own arrangements and he shall be solely responsible for the supply, cartage and storage of the water for the construction of the works and he shall make ample provision in this respect.

The requirements of this clause shall apply regardless of whether the Employer controls the water supplies and makes these available to the Contractor, or whether the Contractor installs his own equipment for the purpose.

PSA-5.8 Ground and access to works

- **Add the following:**

"On completion of operations the Contractor shall restore the ground surface, wherever it may have been disturbed, to its original condition by filling in all ruts with material similar to the material within the rut and levelling the ground and, where necessary, planting grass and shrubs as may be required. Any boundary fences which have been removed or damaged by his operations and activities shall be repaired and/or reinstated at the Contractor's expense".

PSA-5.10 Site Meetings (Additional Sub-clause)

The Contractor or his authorised representative shall attend meetings with representatives of the Employer and the Engineer to be held on the site at regular intervals at dates and times to be determined by the Engineer. Such meetings will be held for evaluating the progress of the contract and for discussing matters pertaining to the contract which any of the parties represented may wish to rise. Such meetings are not intended for discussing matters concerning the normal day-to-day running of the contract.

PSA-8 MEASUREMENT AND PAYMENT

PSA-8.5 Sums stated provisionally by Engineer

• Add the following additional sub-items:

(c) Testing of materials and quality of work:

(1) Acceptance control tests and surveys ordered by the Engineer Unit : ……Provisional Sum

(2) Handling costs and charges on (c)(1) above Unit : Percentage

The stated provisional sum is provided to cover the cost of testing materials and quality of work, to be carried out by an approved independent laboratory as specified in PS-9.2.

All tests as ordered by the Engineer which is not done / does not require to be done by an independent laboratory, shall be for the Contractor's own account. No direct payment will be made for these tests and the cost thereof shall be deemed to be included in the rates and amounts tendered for the various items of work for which these services are required.

The Contractor will be required to make the necessary arrangements for all testing work ordered or approved by the Engineer to be done by an independent laboratory.

The Contractor may claim under this item the cost of all tests done by an approved independent laboratory which passed and which is approved by the Engineer. No payment will be made to the Contractor in respect of tests, which did not pass.

PSD EARTHWORKS

PSD-3 MATERIALS

PSD-3.1 Classification for excavation purposes

PSD-3.1.2 Classes of excavation

For this contract the excavation material will be classified as follows for purposes of measurement and payment:

(a) Hard rock excavation as defined in clause 3.1.2(c).
(b) Soft excavation which will be all excavation other than hard rock excavation.

All boulder excavation will be classified as soft excavation except that boulders of 0,125 m^3 or larger, will be measured individually and paid for as part of hard rock excavation.

PSD- 5 CONSTRUCTION

PSD-5.1 Precautions

PSD-5.1.3 Stormwater and Groundwater

Adequate protection against flooding and damage by stormwater shall be considered to be fulfilled if the precautions are adequate to prevent flooding, damage and disruption of the works which could result during a storm event of 1 in 5 year frequency.

Considerable inflow of storm water may occur in deep excavations. The Contractor will be solely responsible for pumping out inflow to maintain the excavation sufficiently dry to ensure that the works may proceed without delay and that materials to be used in the fills do not become too wet to be used for the specified purpose.

PSD -5.2 Methods and Procedures

PSD -5.2.2 Excavation

The Contractor shall arrange his operations in such a manner that materials with different properties that could be used for fills or other later uses such as cover material or topsoil, do not become mixed thereby making them no longer suitable for their intended purpose. The Contractor shall also ensure that he does not waste any materials that could be used for fills or such other uses as referred to.

PSD -5.2.2.3 Disposal

The Contractor shall make his own arrangement regarding the acquisition of a suitable spoil dump site.

PSD-5.2.5 Transport for Earthworks

PSD-5.2.5.1 Freehaul

- **Add the following:**

"For this contract all haul will be regarded as free haul and the cost of transportation of all materials will be deemed to be included in the rates and prices tendered in the Schedule of Quantities."

PSD-5.2.5.2 Overhaul

No overhaul will be payable on this Contract.

PSD-5.2.6 Inspection of excavations (Additional subclause)

All foundations for structures shall be inspected by the Engineer and/or an Engineering Geologist or Geotechnical Engineer before any backfilling with material or concrete of any kind is commenced. The Engineer shall be given at least two days' notice by the Contractor for the necessary arrangements to be made.

PSD-6 TOLERANCES

PSD-6.1 Position, dimensions, levels, etc.

Degree of Accuracy II shall apply. Overbreak's where applicable shall be filled with 15 MPa concrete or with compacted clay as specified by the Engineer at the Contractor's cost.

PSD-7 TESTING

PSD-7.2 Taking and Testing of Samples

All testing work under this contract will be done by an accredited commercial laboratory elected by the Engineer as set out in PS-9.2. Both the Engineer and the Contractor shall make use of this laboratory.

The Contractor is responsible for his own process and quality control and shall therefore have all necessary tests carried out by the laboratory to ensure that the material and quality of the work conform to the requirements as specified.

The results of all such tests and the positions where samples were taken must be submitted to the Engineer. The number and positions of tests shall be adequate to prove to the Engineer that the works as a whole comply with the requirements.

The Engineer may have additional or acceptance control tests carried out by the independent laboratory and he will make the results available to the Contractor.

A provisional sum is allowed in item PSA-8.5 of the Schedule of Quantities to cover the cost of all tests to be carried out on the work. However, should any of these test results show that the work or the material does not comply with the specifications the Contractor will be responsible for the cost of such testing.

PSD-8 MEASUREMENT AND PAYMENT

PSD-8.3 Scheduled items

PSD-8.3.3 & Bulk and restricted excavation
8.3.3 Delete sub-items (b)(1), (b)(3) and (b)(4).

PSD 8.4

This shall cover the importation of G5 material for foundation fill and compaction to 98 MOD Aashto and testing of compaction to engineer's satisfaction

PSD-8.3.6 Overhaul

Overhaul will not be applicable to this contract and all items and references to overhaul shall be deleted.

PSDB EARTHWORKS (Pipe trenches)

PSDB-3 MATERIALS

PSDB-3.1 Classes of Excavation

For the purpose of this contract the excavation material will generally be classified as follows for purposes of measurement and payment:

(i) Soft excavation

Soft excavation shall be excavation in material that can be efficiently removed and loaded with picks, shovels and other hand tools. Soft excavation shall include all boulders with a volume of less than 0,125 m3 and a maximum dimension of 500 mm, which can still be removed by hand methods.

(ii) Hard excavation

Hard excavation shall be excavation in material, which can only be removed efficiently with mechanical equipment such as jackhammers, drilling and blasting, etc. Hard excavation shall also include boulders with a volume exceeding 0,125 m3 and the maximum dimension exceeding 500 mm, which cannot be broken down and removed by hand methods.

(b) Normal excavation

In cases where heavy excavation equipment is allowed only two classes of excavation will be applicable, i.e. hard rock excavation and soft excavation. Hard rock excavation shall be as specified in SABS 1200 D sub-clause 3.1.2(c) and excavation in all other material will be taken as soft excavation. Boulders, which require individual drilling, and blasting in order to be loaded by a track-type front-end loaders or back-acting excavator, shall be classified as hard rock and will be measured individually as they are removed.

PSDB-5 CONSTRUCTION

PSDB-5.3 Site clearance

Add the following to the clause:

"The Contractor shall dispose of all surplus and unsuitable material on a site to be found by him and approved by the Engineer. All costs related to the disposal of surplus material shall be deemed to be included in the tendered rates."

PSDB-5.6.3 Disposal of Soft Material

Surplus and/or unsuitable excavated material must be disposed of at a site found by the Contractor and approved by the Engineer.

PSDB-5.6.4 Disposal of Intermediate and Hard Rock Material

Intermediate and Hard Rock Material must be disposed of at a site found by the Contractor and approved by the Engineer.
‘

PSDB-7 TESTING

PSDB-7.1 Notwithstanding the contents of Clause 7.1, the Contractor shall bear the cost of all quality control tests regardless of whether the tests indicate acceptable compaction or not.

The following are the minimum frequencies for the process control tests to be executed by the Contractor:

(a) Pipe bedding: one density test on each 50 m of pipe trench.
(b) Normal trench backfilling: one density test on every second layer for every 50 m of pipe trench.
(c) Backfilling in areas subject to vehicle loads: one test on each layer of 150 mm at each road crossing.

The positions of these minimum number of tests shall be determined randomly by the Contractor and shall be clearly documented with the results. The results of the tests shall be submitted to the Engineer and shall prove to the Engineer that the work as a whole was done satisfactorily.

Additional tests, over and above the minimum tests could be ordered by the Engineer. Payment for these tests will be made under Item PSA-8.5 if the tests indicate that the density is as specified. If any tests fail, the cost of such tests shall be for the account of the Contractor.

PSDB-8 MEASUREMENT AND PAYMENT

PSDB-8.3.2 Excavation

Payment for pipe trench excavation shall distinguish between labour-intensive work (hand excavation) and work done by mechanical equipment (machine excavation). Since this project is a labour-intensive project, all the excavations shall be done by labour-intensive methods. Provision is however made for machine excavation to compensate for unpredictable situations (such as bad weather conditions) and only on instruction of the Engineer).

PSDB-8.3.5 (a) Services that intersect a trench

Payment for item includes all services as described in the SANS 1200 DB, with the added consideration for sewer pipes up to 300mm dia. and stormwater pipes up to 1050mm dia.

PSDB-8.3.5 (a) Services that adjoin a trench

Payment for item includes all services as described in the SANS 1200 DB, with the added consideration for sewer pipes up to 300mm dia. and stormwater pipes up to 1050mm dia.

PSGE PRECAST CONCRETE (STRUCTURAL)

PSGE-5 CONSTRUCTION

PSGE-5.1 General

Add the following:

(a) The precast concrete heavy duty signal house must be casted as one complete structure with a cast in base and concrete roof. The door must be galvanised, and the contractor must supply locks for the door.

Minimum Dimensions for the precast concrete heavy duty signal house **should be as follows:**

Internal dimensions: 1860mm x 1860mm
External dimensions:2040mm x 2040mm
Interna Height: 2170mm
External height: 2379mm

PSHA STRUCTURAL STEELWORK (SUNDRY ITEMS)

PSHA-5 CONSTRUCTION

PSHA-5.2 Fabrication and assembly

PSHA-5.2.6 Handrails

Handrails shall be hot-dip galvanized as specified in SABS 763, and shall be the Mentis type or an approved equivalent.

PSHA-5.2.7 Ladders

Ladders and other steelwork inside the water-retaining structures shall be manufactured from grade 316 stainless steel. Stainless steel 316 L welding rods shall be used and welding shall be done according to the MMA process. All welds shall be pickled and passivated after welding.

Ladders and all other structural steel outside the water-retaining structures shall be manufactured from Grade 300 W steel and shall be hot-dip galvanized.

PSHA-6 TOLERANCES

PSHA-6.1 Fabrication and assembly tolerance

Degree II accuracy shall be applicable.

PSHA-8 MEASUREMENT AND PAYMENT

PSHA-8.1 Basic principles

PSHA-8.1.3. Additional clause

Sundry items additional to the scheduled items will be as described in the Schedule of Quantities.

The tendered rates for such sundry items shall cover the cost for supply, manufacture, protective coating and installation or construction and testing (if required) of the items as scheduled and as detailed on the drawings.

PSHA-8.3.6 Corrosion Protection

Corrosion protection will not be measured and paid separately.

The cost of corrosion protection in accordance with SABS 1200 HC shall be deemed to be included in the rates tendered for the applicable items.

PSHA-8.3.8 Sundry items (Additional clause)

Items not described in the specifications or in the Project Specifications may be shown on the drawings or scheduled in the Schedule of Quantities. The unit of measurement will be sum or number as scheduled.

PSLB BEDDING (PIPES) (provisional sub clause)

PSLB-3MATERIALS

PSLB-3.3 Bedding

Unless otherwise indicated or instructed by the Engineer, all pipes shall be laid in class C bedding as shown on the standard drawing.

PSLB-3.4 Selection

PSLB-3.4.3 General (Additional subclause)

The contractor shall use selective methods for the purpose of providing bedding materials and shall avoid the use of plant, which could cause the burying or contamination of material. If, in the opinion of

the engineer, the grading of the selected material excavated from the trench is not suitable, then the engineer may order the contractor to grade the material by screening. The material to be used as bedding shall pass a 10 mm sieve and can be retained on a 5 mm sieve. Screening, if ordered, will be paid for separately.

PSLB- 9-: IRRIGATION SYSTEM

Garden irrigation system to be fully installed and connected to pumps and commissioned with pipes laid on class bedding complete couplings. The irrigation system will include the following.

- 25mm HDPE pipes (class 12)
- Garden impact sprinklers
- Reducing Tees
- HDPE shut off valves

PSLB-8MEASUREMENT AND PAYMENT

PSLB-8.1.3 Volume of Bedding Materials

Add the following:

"The volume of bedding materials shall exclude the volume taken up by the pipe".

PSLB-8.2 Scheduled Items

PSLB-8.2.5 Overhaul of materials for bedding cradle and selected fill blanket

For this contract freehaul is not limited and no payment will be made for overhaul.

PSLB-8.2.6 Screening of selected bedding material (Additional item) Unit: m3

The rate shall cover the cost to screen selected material to comply with the specification for bedding material.

PSLD HANDLING OF EXISTING SEPTIC TANKS

PSLD General (Additional subclause)

The existing septic tanks to be de-sludged with honey suckers, decommissioned, carefully cleaned out and sanitised. Septic tanks to be filled with granular material and compacted in 200mm layers;

• Contractor must provide Medicals to employees including vaccines for working with sewer;
• The existing house connections are to be maintained;

PSLD-8.2 Scheduled Items

PSLD-8.2.3 Pump Chamber Unit : No

The rate shall cover the cost of excavating installing and backfilling of Complete unit, 1.5m diameter, watertight chamber with all accessories as per the submersible pump chamber as shown on drawing provided by engineer.

PSLD-8.4.1 Desludging of existing septic tank Unit : No

The rate shall cover the cost of desludging of a complete septic tank and disposing of sludge to a licenced authorised place identified by the contractor and approved by the engineer.

PSLD-8.4.2 Sanitising of existing septic tanks and french drains Unit: No

The rate shall cover the cost of cleaning and sanitizing septic tanks and French drains with chemicals methods that have been by the engineer.

PSLD-8.4.3 Removal of existing septic tanks and french drains Unit: No

The rate shall cover the cost of removing septic tanks and French drains with methods that have been by the engineer.

PSLD-8.4.4 Backfill existing septic tanks with selected granular material compacted to 90% MOD AASHTO in 200 mm layers Unit: No

The rate shall cover the cost of backfilling and compacting septic tanks and French with G5 of G7 material to 90% MOD AASHTO in 200mm thick layer.

PSLD-8.4.5 Refurbish existing septic tank or build new septic tank with screen and install pipe connection to sump Unit: Sum

The rate shall be a sum and shall cover the cost refurbishing existing septic tank to engineer's satisfaction including the installation of a screen and pipe connection to pump sump. The septic tank shall be refurbished as per provided drawing.

PSLD-8.4.6 Overhead charges for the refurbish existing septic tank or build new septic tank with screen and install pipe connection to sump Unit: %

The rate shall be a percentage markup on the sum for 8.4.5 and shall cover the overhead cost for the refurbishing existing septic tank to engineer's satisfaction including the installation of a screen and pipe connection to pump sump.

C3.3 PARTICULAR SPECIFICATIONS

In addition to the Standardized and Project Specifications the following Particular Specifications shall apply to this contract and are bound in hereafter.

OHSA 1993 - SAFETY SPECIFICATION

PARTICULAR SPECIFICATION PAM: OHSA 1993 - HEALTH AND SAFETY SPECIFICATION

CONTENTS

PAM: OHSA 1993 HEALTH AND SAFETY SPECIFICATION

PAM-1: SCOPE

This specification covers the health and safety requirements to be met by the Contractor to ensure a continued safe and healthy environment for all workers, employees and subcontractors under his control and for all other persons entering the site of works.

This specification shall be read with the Occupational Health and Safety Act (Act No 85 and amendment Act No 181) 1993, and the corresponding Construction Regulations 2003, and all other safety codes and specifications referred to in the said Construction Regulations.

In terms of the OHSA Agreement in Section 9 (Forms to be Completed by Successful Tenderer) of the tender document, the status of the Contractor as mandatary to the Employer (client) is that of an employer in his own right, responsible to comply with all provisions of OHSA 1993 and the Construction Regulations 2003.

This safety specification and the Contractor's own Safety Plan as well as the Construction Regulations 2003, shall be displayed on site or made available for inspection by all workers, employees, inspectors and any other persons entering the site of works.

PAM-2: DEFINITIONS

For the purpose of this contract the following shall apply:

(a) "**Employer**" where used in the contract documents and in this specification, means the Employer as defined in the General Conditions of Contract and it shall have the exact same meaning as "**client**" as defined in the Construction Regulations 2003. "**Employer**" and "**client**" is therefore interchangeable and shall be read in the context of the relevant document.

(b) "**Contractor**", wherever used in the contract documents and in this specification, shall have the same meaning as **"Contractor"** as defined in the General Conditions of Contract.

*In this specification the terms **"principal contractor"** and **"contractor"** are replaced with **"Contractor"** and **"subcontractor"** respectively.*

*For the purpose of this contract the **Contractor** will, in terms of OHSA 1993, be the mandatary, without derogating from his status as an employer in his own right.*

(c) "**Engineer"** where used in this specification, means the Engineer as defined in the General Conditions of Contract. In terms of the Construction Regulations the Engineer may act as agent on behalf of the Employer (the client as defined in the Construction Regulations).

PAM-3: TENDERS

The Contractor shall submit the following with his tender:

(a) a documented Health and Safety Plan as stipulated in Regulation 5 of the Construction Regulations. The Safety Plan must be based on the Construction Regulations 2003 and will be subject to approval by the Employer;
(b) a declaration to the effect that he has the competence and necessary resources to carry out the work safely in compliance with the Construction Regulations 2003;
(c) a declaration to the effect that he made provision in his tender for the cost of the health and safety measures envisaged in the Construction Regulations.

(d) Failure to submit the foregoing with his tender, will lead to the conclusion that the Contractor will not be able to carry out the work under the contract safely in accordance with the Construction Regulations.

PAM-4: NOTIFICATION OF COMMENCEMENT OF CONSTRUCTION WORK

After award of the contract, but before commencement of construction work, the Contractor shall, in terms of Regulation 3, notify the Provincial Director of the Department of Labour in writing if the following work is involved:

(a) the demolition of structures and dismantling of fixed plant of height of 3,0 m or more;
(b) the use of explosives;
(c) construction work that will exceed 30 days or 300 person-days;
(d) excavation work deeper than 1,0 m; or
(e) working at a height greater than 3,0 m above ground or landings.

The notification must be done in the form of the pro forma included under Section 9 (Forms to be Completed by Successful Tenderer) of the tender document.

A copy of the notification form must be kept on site, available for inspection by inspectors, Employer, Engineer, employees and persons on site.

PAM-5: RISK ASSESSMENT

Before commencement of any construction work during the construction period, the Contractor shall have a risk assessment performed and recorded in writing by a competent person. (Refer Regulation 7 of the Construction Regulations 2003).

The risk assessment shall identify and evaluate the risks and hazards that may be expected during the execution of the work under the contract, and it shall include a documented plan of safe work procedures to mitigate, reduce or control the risks and hazards identified.

The risk assessment shall be available on site for inspection by inspectors, Employer, Engineer, subcontractors, employees, trade unions and health and safety committee members, and must be monitored and reviewed periodically by the Contractor.

PAM-6: APPOINTMENT OF EMPLOYEES AND SUBCONTRACTORS

PAM-6.1 Health and Safety plan

The Contractor shall appoint his employees and any subcontractors to be employed on the contract, in writing, and he shall provide them with a copy of his documented Health and Safety Plan, or relevant sections thereof. The Contractor shall ensure that all subcontractors and employees are committed to the implementation of his Safety Plan.

PAM-6.2 Health and safety induction training

The Contractor shall ensure that all employees under his control, including subcontractors and their employees, undergo a health and safety induction training course by a competent person before commencement of construction work. No visitor or other person shall be allowed or permitted to enter the site of the works unless such person has undergone health and safety training pertaining to hazards prevalent on site.

The Contractor shall ensure that every employee on site shall at all times be in possession of proof of the health and safety induction training issued by a competent person prior to commencement of construction work.

PAM-7: APPOINTMENT OF SAFETY PERSONNEL

PAM-7.1: Construction Supervisor

The Contractor shall appoint a full-time Construction Supervisor with the duty of supervising the performance of the construction work.

He may also have to appoint one or more competent employees to assist the construction supervisor where justified by the scope and complexity of the works.

PAM-7.2: Construction safety officer

Taking into consideration the size of the project and the hazards or dangers that can be expected, the Contractor shall appoint in writing a full-time or part-time Construction Safety Officer if so decided by the Inspector of the Department of Labour. The Safety Officer shall have the necessary competence and resources to perform his duties diligently.

Provision will be made in the schedule of quantities to cover the cost of a dedicated construction safety officer appointed after award of the contract if so ordered by the Engineer.

PAM-7.3: Health and safety representatives

In terms of Sections 17 and 18 of the Act (OHSA 1993) the Contractor, being the employer in terms of the Act for the execution of the contract, shall appoint a health and safety representative whenever he has more than 20 employees in his employment on the site of the works. The health and safety representative must be selected from employees who are employed in a full-time capacity at a specific workplace.

The number of health and safety representatives for a workplace shall be at least one for every 100 employees.

The function of the health and safety representative(s) will be to review the effectiveness of health and safety measures, to identify potential hazards and major incidents, to examine causes of incidents (in collaboration with his employer, the Contractor), to investigate complaints by employees relating to health and safety at work, to make representations to the employer (Contractor) or inspector on general matters affecting the health and safety of employees, to inspect the workplace, plant, machinery etc. on a regular base, to participate in consultations with inspectors and to attend meetings of the health and safety committee.

PAM-7.4: Health and safety committee

In terms of Sections 17 and 18 of the Act (OHSA 1993) the Contractor (as employer), shall establish one or more health and safety committee(s) where there are two or more health and safety representatives at a workplace. The persons selected by the Contractor to serve on the committee shall be designated in writing.

The function of the health and safety committee shall be to hold meetings at regular intervals, but at least once every three months, to review the health and safety measures on the contract, to discuss incidents related to health and safety with the Contractor and the inspector, and to make recommendations regarding health and safety to the Contractor and to keep record of recommendations and reports made by the committee**.**

PAM-7.5: Competent persons

In accordance with the Construction Regulations the Contractor has to appoint in writing competent persons responsible for supervising construction work on each of the following work situations that may be expected on the site of the works.

(a) Risk assessment and induction training as described in Regulation 7 of the Construction Regulations;
(b) Full protection as described in Regulation 8;
(c) Formwork and support work as described in Regulation 10;
(d) Excavation work as described in Regulation 11;
(e) Demolition work as described in Regulation 12;
(f) Scaffolding work as described in Regulation 14;
(g) Suspended platform operations as described in Regulation 15;
(h) Batch plant operations as described in Regulation 18;
(i) Construction vehicle and mobile plant inspections on a daily basis by a competent person as described in Regulation 21(1);
(j) Control of all temporary electrical installations on the construction site as described in Regulation 22.
(k) Stacking and storage on construction sites as described in Regulation 26; and
(l) Inspections of fire equipment as described in Regulation 27.

A competent person may be appointed for more than one part of the construction work with the understanding that the person must be suitably qualified and able to supervise at the same time the construction work on all the work situations for which he has been appointed.

The appointment of competent persons to supervise parts of the construction work does not relieve the Contractor from any of his responsibilities to comply with all requirements of the Construction Regulations.

PAM-8: RECORDS AND REGISTERS

In accordance with the Construction Regulations the Contractor is bound to keep records and registers related to health and safety on site for periodic inspection by inspectors, the Engineer, the Employer, trade union officials and subcontractors and employees. The following records and registers must be kept on site and shall be available for inspection at all times.

(a) A copy of the OHSA 1993 Construction Regulations 2003;
(b) A copy of this Health and Safety Specification;
(c) A copy of the Contractor's Health and Safety Plan (Regulation 4);
(d) A copy of the Notification of Construction Work (Regulation 3);
(e) A health and safety file in terms of Regulation 5(7) with inputs by the Construction Safety Officer [Regulation 6(7)];
(f) A copy of the risk assessment described in Regulation 7;
(g) A full protection plan and the corresponding records of evaluation and training of employees working from elevated positions as described in Regulation 8;
(h) Drawings pertaining to the design of structures [Regulation 9(3)] and formwork and support work structures [Regulation 10(d)] must be kept on site;
(i) Pronouncement of the safety of excavations must be recorded in a register to be kept on site [Regulation 11(3)(h)];
(j) A copy of the certificate of the system design for suspended platforms [Regulation 15(3)];
(k) A notice must be affixed around the base towers of material hoists to indicate the maximum mass load, which may be carried at any one time by material hoists [Regulation 7(5)].
(l) Maintenance records of material hoists and inspection results must be kept in a record book to be kept on site [Regulation 17(8)];
(m) A record of any repairs to or maintenance of a batch plant must be kept on site [Regulation 18(9)];
(n) A warning notice must be displayed in a conspicuous manner when and wherever an explosive powered tool is used [Regulation 19(2)];
(o) A register for recording of findings by the competent person appointed to inspect construction vehicles and mobile plant [Regulation 21(1)(j)].

PAM-9: CONTRACTOR'S RESPONSIBILITIES

For this contract the Contractor will be the mandatory of the Employer (Client), as defined in the Act (OHSA 1993), which means that the Contractor has the status of employer in his own right in respect of the contract. The Contractor is therefore responsible for all the duties and obligations of an employer as set out in the Act (OHSA 1993) and the Construction Regulations 2003.

Before commencement of work under the contract, the Contractor shall enter into an agreement with the Employer (Client) to confirm his status as mandatory (employer) for the contract under consideration.

The Contractor's duties and responsibilities are clearly set out in the Construction Regulations 2003, and are not repeated in detail but some important aspects are highlighted hereafter, without relieving the Contractor of any of his duties and responsibilities in terms of the Construction Regulations.

(a) Contractor's position in relation to the Employer (Client) *(Regulation 4)*

In accordance with Section 4 of the Regulations, the Contractor shall liaise closely with the Employer or the Engineer on behalf of the Employer, to ensure that all requirements of the Act and the Regulations are met and complied with.

(b) The Principal Contractor and Contractor (Regulation 5)

The Contractor is in terms of the definition in Regulation 2(b) the equivalent of Principal Contractor as defined in the Construction Regulations, and he shall comply with all the provisions of Regulation 5.

Any subcontractors employed by the Contractor must be appointed in writing, setting out the terms of the appointment in respect of health and safety. An independent subcontractor shall however provide and demonstrate to the Contractor a suitable, acceptable and sufficiently documented health and safety plan before commencement of the subcontract. In the absence of such a health and safety plan the subcontractor shall undertake in writing that he will comply with the Contractor's safety plan, the health and safety specifications of the Employer and the Construction Regulations 2003.

(c) Supervision of construction work (Regulation 6)

The Contractor shall appoint the safety and other personnel and employees as required in terms of Regulation 6 and as set out in paragraph 7 above. Appointment of those personnel and employees does not relieve the Contractor from any of the obligations under Regulation 6.

(d) Risk assessment (Regulation 7)

The Contractor shall have the risk assessment made as set out in paragraph 7 above before commencement of the work, and it must be available on site for inspection at all times. The Contractor shall consult with the health and safety committee or health and safety representative(s) etc. on a regular basis to ensure that all employees, including subcontractors under his control, are informed and trained by a competent person regarding health hazards and related work procedures.

No subcontractor, employee or visitor shall be allowed to enter the site of works without prior health and safety induction training, all as specified in Regulation 7.

(e) Fall protection (Regulation 8)

Fall protection, if applicable to this contract shall comply in all respects with Regulation 8 of the Construction Regulations.

(f) Structures (Regulation 9)

The Contractor will be liable for all claims arising from collapse or failure of structures if he failed to comply with all the specifications, project specifications and drawings related to the structures, unless it can be proved that such collapse or failure can be attributed to faulty design or insufficient design standards on which the specifications and the drawings are based.

In addition the Contractor shall comply with all aspects of Regulation 9 of the Construction Regulations.

(g) Formwork and support work (Regulation 10)

The Contractor will be responsible for the adequate design of all formwork and support structures by a competent person.

All drawings pertaining to formwork shall be kept on site and all equipment and materials used in formwork, shall be carefully examined and checked for suitability by a competent person.

The provisions of Regulation 10 of the Construction Regulations shall be followed in every detail.

(h) Excavation work (Regulation 11)

It is essential that the Contractor shall follow the instructions and precautions in the Standard Specifications and Project Specifications as well as the provisions of the Construction Regulations to the letter as unsafe excavations can be a major hazard on any construction site. The Contractor shall therefore ensure that all excavation work is carried out under the supervision of a competent person, that inspections are carried out by a Professional Engineer or Technologist, and that all work is done in such a manner that no hazards are created by unsafe excavations and working conditions.

Supervision by a competent person will not relieve the Contractor from any of his duties and responsibilities under Regulation 11 of the Construction Regulations.

(i) Demolition work (Regulation 12)

Whenever demolition work is included in a contract, the Contractor shall comply with all the requirements of Regulation 12 of the Construction Regulations. The fact that a competent person has to be appointed by the Contractor does not relieve the Contractor from any of his responsibilities in respect of safety of demolition work.

(j) Tunnelling (Regulation 13)

The Contractor shall comply with Regulation 13 wherever tunnelling of any kind is involved.

(k) Scaffolding (Regulation 14)

The Contractor shall ensure that all the provisions of Regulation 14 of the Construction Regulations are complied with. [*Note : Reference in the Regulations to "Section 44 of the Act" should read "Section 43 of the Act"]*

(l) **Suspended platforms (Regulation 15)**

Wherever suspended platforms will be necessary on any contract, the Contractor shall ensure that copies of the system design issued by a Professional Engineer are submitted to the Engineer for inspection and approval. The Contractor shall appoint competent persons as supervisors and competent scaffold erectors, operators and inspectors and ensure that all work related to suspended platforms are done in accordance with Regulation 15 of the Construction Regulations.

(m) Boatswain's chairs (Regulation 16)

Where boatswain's chains are required on the construction site, the Contractor shall comply with Regulation 16.

(n) Material Hoists (Regulation 17)

Wherever applicable, the Contractor shall comply with the provisions of Regulation 17 to the letter.

(o) Batch plants (Regulation 18)

Wherever applicable, the Contractor shall ensure that all lifting machines, lifting tackle, conveyors, etc. used in the operation of a batch plant shall comply with, and that all operators, supervisors and employees are strictly held to the provisions of Regulation 18. The Contractor shall ensure that the General Safety Regulations (Government Notice R1031 of 30 May 1986), the Driven Machinery Regulations (Government Notice R295 of 26/2/1988) and the Electrical Installation Regulations (Government Notice R2271 of 11/10/1995) are adhered to by all involved.

In terms of the Regulations, records of repairs and maintenance shall be kept on site.

(p) Explosive powered tools (Regulation 19)

The Contractor shall ensure that, wherever explosive-powered tools are required to be used, all safety provisions of Regulation 19 are complied with.

It is especially important that warning notices are displayed and that the issue and return of cartridges and spent cartridges be recorded in a register to be kept on site.

(q) Cranes (Regulation 20)

Wherever the use of tower cranes becomes necessary, the provisions of Regulation 20 shall be complied with.

(r) **Construction vehicles and mobile plant (Regulation 21)**

The Contractor shall ensure that all construction vehicles and plant are in good working condition and safe for use, and that they are used in accordance with their design and intended use. The vehicles and plant shall only be operated by workers or operators who have received appropriate training, all in accordance with all the requirements of Regulation 21.

All vehicles and plant must be inspected on a daily basis, prior to use, by a competent person and the findings must be recorded in a register to be kept on site.

(s) Electrical installation and machinery on construction sites (Regulation 22)

The Contractor shall comply with the Electrical Installation Regulations (Government Notice R2920 of 23 October 1992) and the Electrical Machinery Regulations (Government Notice R1953 of 12 August 1993). Before commencement of construction, the Contractor shall take adequate steps to ascertain the presence of, and guard against dangers and hazards due to electrical cables and apparatus under, over or on the site.

All temporary electrical installations on the site shall be under the control of a competent person, without relieving the Contractor of his responsibility for the health and safety of all workers and persons on site in terms of Regulation 22.

(t) **Use of temporary storage of flammable liquids on construction sites (Regulation 23)**

The Contractor shall comply with the provisions of the General Safety Regulations (Government Notice R1031 of 30 May 2986) and all the provisions of Regulation 23 of the Construction Regulations to ensure a safe and hazard-free environment to all workers and other persons on site.

(u) Water environments (Regulation 24)

Where construction work is done over or in close proximity to water, the provisions of Regulation 24 shall apply.

(v) Housekeeping on Construction sites (Regulation 25)

Housekeeping on all construction sites shall be in accordance with the provisions of the environmental Regulations for workplaces (Government Notice R2281 of 16 October 1987) and all the provisions of Regulation 25 of the Construction Regulations.

(w) Stacking and storage on construction sites (Regulation 26)

The provisions for the stacking of articles contained in the General Safety Regulations (Government Notice R1031 of 30 May 1986) as well as all the provisions of Regulation 26 of the Construction Regulations shall apply.

(x) Fire precautions on construction sites (Regulation 27)

The provisions of the Environmental Regulations for Workplaces (Government Notice R2281 of 16 October 1987) shall apply.

In addition the necessary precautions shall be taken to prevent the incidence of fires, to provide adequate and sufficient fire protection equipment, sirens, escape routes etc. all in accordance with Regulation 27 of the Construction Regulations.

(y) Construction welfare facilities (Regulation 28)

The Contractor shall comply with the construction site provisions as in the Facilities Regulations (Government Notice R1593 of 12 August 1988) and the provisions of Regulation 28 of the Construction Regulations.

(z) Non-compliance with the Construction Regulations 2003

The foregoing is a summary of parts of the Construction Regulations applicable to all construction projects.

The Contractor, as employer for the execution of the contract, shall ensure that all provisions of the Construction Regulations applicable to the contract under consideration are complied with to the letter.

Should the Contractor fail to comply with the provisions of the Regulations 3 to 28 as listed in Regulation 30, he will be guilty of an offence and will be liable, upon conviction, to the fines or imprisonment as set out in Regulation 30.

The Contractor is advised in his own interest to make a careful study of the Act and the Construction Regulations as ignorance of the Act and the Regulations will not be accepted in any proceedings related to non-conformance to the Act and the Regulations.

PAM-10: MEASUREMENT AND PAYMENT

PAM-10.1: Principles

It is a condition of this contract that Contractors, who submit tenders for this contract, shall make provision in their tenders for the cost of all health and safety measures during the construction process.

(a) Safety personnel

The Construction Supervisor, the Construction Safety Officer, Health and Safety Representatives, Health and Safety Committee and Competent Persons referred to in clauses PAM-7.1 to 7.5 shall be members of the Contractor's personnel, and no additional payment will be made for the appointment of such safety personnel.

However, should it be necessary to appoint a dedicated Construction Safety Officer in terms of Clause PAM-7.2 on the instruction of the Inspector of the Department of Labour, as ordered by the Engineer, payment will be considered for such appointment.

(b) Records and Registers,

The keeping of health and safety-related records and registers as described in PAM-8 is regarded as a normal duty of the Contractor for which no additional payment will be considered, and which is deemed to be included in the Contractor's tendered rates and prices.

PARTICULAR SPECIFICATION PBA: BUILDING WORK (Small Works)

CONTENTS

PARTICULAR SPECIFICATION PBA : BUILDING WORK (Small Works)

PBA-1 SCOPE

This specification covers the general description of materials and methods to be used for buildings, manholes and other small structures generally related to civil engineering construction and building work. This specification is based on the use of burnt clay bricks but concrete masonry building blocks approved by the Engineer may be used.

Variations to this specification, if any, are included in the Project Specifications in the Project document.

PBA-2 MATERIALS

PBA-2.1 Sand

Sand shall be free from dust, soft particles, clay and organic matter and shall be graded from a maximum sieve size of 2,36 mm to a minimum size of 0,150 mm. Samples of the sand shall be

submitted to the Engineer for approval and thereafter all sand used shall be equal to the approved sample. The sand shall comply with the requirements of SABS 1090.

PBA-2.2 Cement

Cement shall be ordinary Portland cement complying with the requirements of SABS ENV-197 and masonry cement complying with SABS ENV-413.

PBA-2.3 Cement mortar

Unless otherwise specified, cement mortar shall be composed of one part cement by five parts sand measured by volume. The materials are to be mixed dry until the mixture is of a uniform colour and clear water is then added gradually through a fine rose and the mixture turned over until the ingredients are thoroughly incorporated.

Cement mortar shall be mixed in small quantities which shall be used within one hour of mixing. The use of cement mortar that has commenced to set will not be permitted.

Cement mortar which had already set or is partly set shall be removed from the mixing surface and shall not be added to a new mix.

PBA-2.4 Cement plaster

Cement plaster, where prescribed, shall consist of one part cement by four parts sand measured by volume, applied to a minimum thickness of 10 mm.

PBA-2.5 Masonry Units (Bricks)

Masonry units shall be either facing (FBS, FBX or FBA), non-facing (NFP, NFX, also known as common stock or plaster units) or engineering units (identified with letter E and a number equal to nominal compressive strength e.g. FBSE 21) complying with the requirements of SABS 227 and shall only be obtained from an approved manufacturer. Concrete masonry units complying with SABS 1215 may be used as an alternative to burnt clay bricks, if approved by the Engineer.

The Contractor shall submit to the Engineer sample bricks which, if approved, shall be retained by him as standard specimens. The water absorption when tested in conformity with the requirements of SABS 227 shall not exceed 12 per cent. The nominal compressive strengths shall normally be:

7 MPa for superstructures;
10,5 MPa for foundations; and
14 MPa for load-bearing structures,

unless otherwise indicated on the drawings or specified in the project specifications.

Facing bricks must be selected by the manufacturer at his brickyard or by the Contractor on site to ensure a proper mix of bricks within the colour range of each type of facing brick. Sudden changes in the general colour of any facing brickwork will not be acceptable.

The Engineer shall have the right to reject any consignment of bricks from which random samples are not equal to the standard specimens. The removal of rejected bricks and the re-delivery of approved bricks shall be at the Contractor's cost.

Special care shall be taken to preserve the arises and faces of the face bricks during transport, off-loading and handling. The off-loading of facing bricks shall be carried out by hand and no "tip-up" off-loading will be permitted.

PBA-2.6 Wire Ties

Wire ties for solid walls and linings shall be of the single wire type and shall be formed of 3,15 mm dia galvanized steel wire, bent and twisted to shape and complying with the requirements of SABS 28.

For cavity walls the ties shall be of the butterfly or modified PWD type. Ties shall be of sufficient length so as to build at least 75 mm of each end into the brickwork or concrete.

PBA-2.7 Reinforcement for brick walls

Reinforcement for brick walls shall be manufactured from hard drawn steel wire complying with the requirements of BS 785, and shall consist of two 3,25 mm diameter main wires spaced to suit wall thickness, with 2,5 mm cross wires at 300 mm centres, welded at the intersections. The reinforcement for brickwork shall overlap at least 300 mm and at intersections the overlap shall be equal to the width of the widest reinforcement at the intersection.

PBA-2.8 Damp-proofing

Damp-proof courses, unless otherwise specified, shall be either an asphaltic damp-proof course with a base of fibre felt complying with type FV of SABS 248, and with a mass of 65 kg per roll of 20 m^2, or a plastic damp-proof course of 150 micron thickness complying with type B of SABS 952.

PBA-3. CONSTRUCTION

PBA-3.1 Brickwork

(a) General

Brickwork, wherever practicable shall be built in English bond. Stretcher bond may be used where prescribed or approved by the Engineer or where English bond is not feasible. Half-brick walls, walls in two skins and cavity walls shall have the separate skins built in stretcher bond. No false headers and only whole bricks shall be used except where legitimately required to form bond.

The bricks shall be well wetted with water before being laid and the course of bricks last laid shall be well wetted before bedding fresh bricks upon it.

Each course of brickwork shall be laid on a full mortar bed.

The brickwork shall have all joints filled with mortar for each course solid throughout the whole width of each course, prior to placing the next mortar bed. Mortar beds and joints shall not be less than 5 mm or more than 10 mm in thickness.

All brickwork in foundations and elsewhere, all free-standing columns of three-brick width or less, half brick walls and chimneys above ceiling level shall be built in 1:5 cement mortar. Brickwork arches and lintels shall be constructed in 1:3 cement mortar. All walls shall be built up in regular and horizontal courses. Corners and other advanced work shall be raked back and not raised by more than 1,2 m above adjoining work.
Pointing shall be done as the work proceeds. The joints of all walls to be plastered or tiled shall be raked out 15 mm as the work proceeds to form a key for plaster or screed.

All necessary openings for pipes etc shall be formed or left open to be filled in later after the pipes etc have been placed in position.

Walls should in general be built up to two courses above panel ceilings.

(b) Cavity walls

Cavity walls shall consist of two brick skins with a cavity of 50 mm between the skins. The two skins shall be tied together with galvanized wall ties, (butterfly type, L =200 or similar approved or as specified) carefully placed at 1 m centres at every third course of brickwork. At least 75 mm of each

end shall be built into the brickwork, and the ties shall be staggered. In no case shall the outer skin fall inwards towards the inner skin of the wall.

Care shall be taken to keep the cavity free of mortar droppings or other matter, by movable boards or other means, and temporary openings shall be left at plinth level through which any such droppings, etc., can be removed. The openings shall be made good on completion.

At door, window and other openings the cavities shall be stopped 100 mm back from heads, jambs and sills of openings.

(c) Brickwork in facing bricks

In all face brickwork the bond shall be set out on the first level course of brickwork, internally at floor level and externally two courses below ground level.

The bond, if necessary, shall be broken in the centre of panels under windows or at piers between windows.

No broken bond will be allowed at reveals or quoins.

All perpends shall be kept true and all courses shall be built to gauge rods.

Where facings thinner than the standard are required, the facing bricks shall be machine cut to the required size.

Half-brick walls built in facing bricks and pointed on both sides shall be built in face bricks specially selected for evenness of size to give an even face on both sides of wall.

Facings shall be carefully protected from damage, mortar droppings and paint splashes during the contract period and, on completion of the contract, they shall be thoroughly cleaned down and left perfect.

Scaffold planks shall not be allowed to butt against facings except where this is unavoidable. During rain any such scaffold planks shall be removed from contact with the facings.

Except where otherwise described, or where required to match existing work, all facings are to be pointed as the work proceeds with 10 mm deep square recessed horizontals and vertical joints.

The practice of oiling facings on completion will not be allowed.

PBA-3.2 Preparation of cement plaster surfaces and painting

Any cracks in the cement plaster shall be scraped out and filled with an approved stopper or patching plaster, and then rubbed flush. The whole surface shall then be well brushed down to remove all loose dust and powdery material and washed, if necessary, in order to remove all traces of efflorescence to render a surface suitable for the application of the paint.

The paint finish shall be applied in three coats, i.e. a plaster primer coat of acrylic PVA, and two coats of acrylic PVA, as approved by the Engineer.

PBA-3.3 Brick reinforcement

The following reinforcement shall be used unless otherwise specified.

(a) For 114 mm walls and 278 mm cavity walls:

Two 3,25 mm diameter wires at 75 mm c/c per wall.
(b) For 228 mm walls:
Two 3,25 mm diameter wires at 150 mm c/c.

(c) For 252 mm cavity walls:
Two 3,25 mm diameter wires at 228 mm c/c.
The reinforcement shall be placed in every fourth course and shall be symmetrically placed along the centre of the wall. It shall also run the full length of a wall and no joints in between will be allowed.

PBA-3.4 Damp proof courses

The material shall be delivered to site in the original wrapping as supplied by the manufacturer, and each package shall bear the SABS mark.

The sheeting shall be cut into strips of the required width and laid on all foundation walls to the full thickness of the walls without any longitudinal joints. At ends, angles and intersections the sheeting shall be lapped 150 mm and sealed. In cavity walls the sheeting shall be laid across the full width of the wall, including the cavity, and shall be stepped up one course in the cavity over a cement mortar triangular fillet, so that the sheeting under the inner skin of the wall is higher than that under the outer skin of the wall.

Under all window sills exposed to the weather sheeting shall be laid on the brickwork in the first joint immediately below the sill turned up with an easy bend and tucked into the window frame.

Sheeting shall be laid over reinforced brick lintels exposed to the weather to form a damp-proof course as detailed above for solid and cavity walls.

PBA-4. MEASUREMENT AND PAYMENT

PBA-4.1 Brickwall (state thickness, and whether solid or cavity, and class of bricks used) Unit : square metre (m^2)

The unit of measurement shall be the square metre of brickwork after the areas of doors, windows and other similar large openings have been deducted.

The tendered rate shall cover the cost of all labour, plant, materials, reinforcement, wall ties the building in of pipes (or forming of openings therefor), forming of reveals, and other incidentals not scheduled separately, to complete the work as specified.

The unit of measurement shall be the square metre of damp proof course placed in position, or the metre of damp-proof course where the width is specified.

The tendered rate shall cover the cost of all labour, plant and materials to complete the work as specified.

PBA-4.3 Drainage

(a) Drainage pipes below building (refer to drawings) Unit: Sum
(b) Fin drains against retaining wall (refer to drawings) Unit: m

The tendered sum shall cover the cost of all labour, materials, equipment and all incidentals required for the installation and construction of the drainage components in accordance with the drawings.

PBA-4.4 Plaster Unit : square metre (m^2)

The unit of measurement shall be the square metre plaster constructed.

The tendered rate shall cover the cost of all labour, plant, materials and incidentals necessary to complete the work as specified.

PBA-4.5 Paintwork (specify items) Unit : Sum

The tendered sum for each item shall cover the cost of all materials required to paint the specified items in accordance with the specifications and the drawings. The painting of items for which paintwork has already been included (windows, doors etc) will not be measured separately under this item.

PBA-4.6 Miscellaneous

This item includes components of building work not specified. The unit of measurement is number, metre, square metre, cubic metre or sum as indicated in the schedule of quantities.

The tendered rate for each component shall cover the cost of all labour, materials, plant and incidentals necessary to complete the installation or construction as detailed on the drawings.

PARTICULAR SPECIFICATION PCB: FENCING

CONTENTS

PARTICULAR SPECIFICATIONS PCB : FENCING

PCB-1 **SCOPE**

This Specification covers the moving of existing fences where necessary, the erection of new fences, the dismantling of existing fences and the stacking of the fencing material, and the replacing or repair of existing fences where so indicated on the drawings or as directed by the Engineer. Any deviation from this Specification will be included in the Project Specifications.

PCB-2 MATERIALS

PCB-2.1 Posts

Posts, stays, standards and droppers shall comply with the requirements of the following standard specifications:

SABS 280: Hole Location in Fencing Posts and droppers.

SABS 1372: Prefabricated Concrete Components for Fences

CKS 82: Steel Posts, Stays, Standards, and Droppers for Strained Wire Fences.

Unless otherwise shown on the drawings, any of the sections specified in CKS 82 for posts, standards and droppers will be acceptable except that wire droppers shall not be used. "Acceptable" shall mean "acceptable to the Engineer".

Lengths and sizes of posts, standards and droppers as well as spacing of holes shall be as shown on the drawings.

PCB-2.2 Bolts for stays

All exposed steel shall be hot-dip galvanized. Bolts shall be galvanized steel bolts of the required length and shall be at least 12 mm dia. All the necessary bolts and washers shall be supplied with each post.

PCB-2.3 Wire

All wire shall be hot-dip galvanized (class C) with a first-class zinc coating and shall comply with the requirements of SABS 675.

(a) Barbed wire shall be one of the following:

(i) High tensile grade, 2,80 mm average dia. oval, single-strand wire for use at a height of less than 500 mm above the ground.

(ii) High tensile grade, 2,36 mm average dia. oval, single-strand wire for use at a height of more than 500 mm above the ground.

(iii) Mild steel grade, 2 x 2,50 mm dia. double-strand, unidirectional twist wire for use at any height above the ground.

Barbs shall be manufactured from 2,0 mm wire, spaced at a maximum spacing of 150 mm, with a length of at least 13 mm.

(b) Smooth wire shall be as for equivalent thicknesses of the wire specified below:

(i) Fencing wire shall be high-tensile steel wire with a minimum diameter of 2,24 mm.

(ii) Straining wire shall be mild-steel wire with a minimum diameter of 4,00 mm.

(iii) Tying wire shall be mild-steel wire with a minimum diameter of 2,50 mm for tying fencing wire to standards and droppers and 1,6 mm for tying netting and mesh wire to fencing wire.

PCB-2.7 Razor Wire

(a) Razor wire concertina

Razor wire concertina is supplied in rolls of diameter of 200 mm up to 980 mm to be installed in lengths of respectively 8 m to 15 m. Coil diameter, installed lengths, number of spiral turns per coil, mass of coils, number of clips per spiral and coil diameter when stretched shall be as specified in the project specifications or in the schedule of quantities.

The wire shall be 2,5 mm diameter 1500 MPa high tensile steel wire.

The blades shall be 19 mm wide (before crimping), 20 mm to 25 mm long spaced at 15 mm between the ends of the blades (or maximum 40 mm centres).

Clips shall be heavy-duty steel clips 10 mm wide and 2,5 mm thick with dovetail joints.

Galvanising of all the components shall comply with SABS 763.

(b) Razor wire flatwrap coils

Flatwrap is fabricated from a high-tensile razor wire clipped into a flat panel formation. Razor wire flat wrap coils are supplied in rolled-up coils of heights from 500 mm to 900 mm in lengths of 15 m. The heights, length and mass of coils shall be as specified in the project specifications or in the schedule of quantities.

The wire, blades and clips shall be as for razor wire concertinas as specified above.

(c) Welded razor mesh

Razor mesh is made of barbed tape razor wire welded into diamond-patterned apertures. The razor mesh is supplied in 6 m lengths with heights of 1,23 m to 2,4 m as specified in the schedule of quantities.

The aperture size shall be 150 mm wide and 300 mm high.

The wires, blades and clips shall be as specified above for razor wire concertinas.

PCB-2.8 **Gates**

Gates shall be manufactured to the dimensions shown on the drawings, and shall comply with CKS 145:Gates, Steel, with Tubular Frames (for Farm and Domestic use), unless otherwise detailed on the drawings.

Gates shall be complete in every respect including hinges, washers, bolts and locking chain to make it operative and shall be hot-dip galvanized.

PCB-3 CONSTRUCTION

PCB-3.1 Clearing fence line

The fence line shall be cleared over a width of at least 1 m on each side of the centre line of the fence as agreed with the Engineer prior to clearing, and surface irregularities shall be graded so that the fence will follow the general contour of the ground. Clearing shall include the removal of all scrub,

stumps, trees, rock and other obstructions which will interfere with proper construction of the fence. Stumps within the cleared space shall be grubbed. No trees may be removed without the written instruction of the Engineer. The bottom of the fence shall be located a uniform distance above the ground line in accordance with the requirements shown on the drawings. All material resulting from clearing operations shall be removed from the site to authorised dumping areas.

PCB-3.2 Dismantling and removal of existing fences

Where so directed by the Engineer existing fences and gates shall be dismantled and removed from the site. Existing fences dismantled shall not be moved and re-erected elsewhere on the site unless so instructed by the Engineer.

PCB-3.3 Installing posts and standards

All posts and standards shall be firmly planted into the natural ground, be it soil, gravel or rock, at such spacing as shown on the drawings.

The lengths of all posts above ground shall be such that the correct clearance between the lowest wire and the ground can be maintained.

Straining posts shall be erected at all ends and corners or bends in the line of the fence and at all junctions with other fences, provided that straining posts shall not be spaced further apart than shown on the drawings.

Spacing of standards shall not be more than that shown on the drawings, provided that the spacing of standards between any two straining posts shall be uniform.

All posts, stays and standards consisting of wooden poles, pipes, rolled steel, angle sections or rail sections shall be set in dug holes and provided with concrete bases. Holes shall be dug to the full specified depth, even in rock where blasting may prove necessary to obtain the required depth.

Unless otherwise shown on the drawings, the horizontal dimensions of grade 20 MPa/19 mm concrete bases shall be 0,5 m by 0,5 m while the concrete base shall extend at least 600 mm from the ground surface down, to 75 mm above the bottom of the post. Excavations for concrete bases shall be accurate and the whole excavation shall be refilled with concrete, unless otherwise authorised by the Engineer.

Standards consisting of I-section, bulb-T, bell or Y-profile shall either be driven, or set in holes drilled into rock. The holes shall be of such size that a tight fit is obtained. When standards are driven, care shall be exercised to prevent damaging or buckling of standards. Damaged standards shall be replaced at the Contractor's expense.

Corner, end, gate and straining posts shall be braced by means of stays as shown on the drawings or as directed by the Engineer. Pipe stays shall be bolted to the posts. Gate posts shall not be used as straining posts, but at each gate post a straining post shall be placed 2 m away from the gate post and stayed to the bottom of the gate post.

All posts and standards shall be accurately aligned and set plumb. Where veranda-type security fencing is used the posts shall be planted with the overhang on the side of the Employer's property or as directed by the Engineer. After posts and standards have been firmly set in accordance with the foregoing requirements, the fence wire shall be attached thereto at the spacings shown on the drawings.

PCB-3.4 Installing wire

All fencing wire shall be attached to the sides of posts and standards to prevent the wire from displacing or becoming loose. The wire shall be carefully stretched and hung without sag, and with true alignment, care being exercised not to stretch the wire so tightly that it will break or that end, corner, straining, or gate posts will be pulled up.

The maximum force in fencing wire after it has been stretched between straining posts but before it has been secured to the standards shall be 0,9 kN.

All fencing wire shall be securely fastened in the correct position to each standard with soft galvanized binding wire. The binding wire for each horizontal fence wire shall pass through a hole or notch in the standard to prevent slipping of the fence wire in a vertical direction, while the ends of the wire shall be wound at least four times around the fencing wire to prevent movement in a horizontal direction.

At end, corner, straining and gate posts the fencing wire shall be securely wrapped twice around the post from inside and secured against slipping by tying the ends tightly to each other by means of at least six snug tight twists.

In the case of high tensile wire two long windings may first be made before the six tight twists, to prevent the wire from breaking at the first twist. When using smooth wire the loose end shall preferably be bent over and hooked into the notch between the fencing wire and the first winding.

Splices in the fencing wire will be permitted if made in the following manner using a splice tool. The end of each wire at the splice shall be carried at least 75 mm past the splice tool and wrapped snugly around the other wire for not less than 6 complete turns, the two separate wire ends being turned in opposite directions. After the splice tool is removed the space left by it in the splice wire shall be closed by pulling the wire ends together. The unused ends of wire shall be cut close so as to leave a neat splice.

The gaps between gate posts and the adjacent straining posts shall be fenced off with short fencing wires.

Droppers shall be placed at intervals not exceeding those shown on the drawings, and shall be tied to each fence wire with soft binding wire in the required position as specified for standards to prevent slipping in a vertical direction. The spacing of droppers and standards between any two straining posts shall be constant. Droppers shall not stand on the ground but shall clear the ground by at least 25 mm.

PCB-3.5 Installing weld-mesh and diamond mesh

In the case of vermin proof, pedestrian and security fences, or where indicated by the Engineer, wire netting or weld-mesh shall be stretched against the fence and properly tied to the fencing wire as shown on the drawings. The weld mesh or wire netting shall be secured by means of 1,6 mm soft galvanized binding wire at 1,2 m centres along the top and bottom wire and at 2,4 m centres along each of the other fencing wires.

In the case of vermin proof fences the space between the ground surface and the bottom fencing wire shall be properly closed by means of a row of stones hand-packed tightly against each other on either side of the fence. The minimum dimension of stones used for this purpose shall be 200 mm.

PCB-3.6 Installing razor wire

(a) Razor wire concertina

Razor wire rolls shall be joined together and fixed to the wire of the fence with appropriate galvanized clips spaced at three to five clips per spiral as specified by the manufacturer.

(b) Razor wire flatwrap coils

Razor wire flatwrap coils shall be installed against existing smooth wire mesh fences or on top of brick walls in accordance with the directions of the manufacturer.

(c) Welded razor mesh

The welded razor mesh shall be erected as a fence on its own as in the case of weld-mesh and diamond mesh fencing. The welded razor mesh shall be secured to the fencing wire by means of 1,6 mm soft galvanised binding wire at 1,2 m centres along the top and bottom wires and at 2,4 m centres along each of the other fencing wires.

PCB-3.7 Closing of openings under fences

At ditches, streams, drainage channels or other hollows where it is not possible to erect the fence so that it follows the general contour of the ground, the Contractor shall close the openings under the fence by means of horizontal barbed wires spaced at distances of l50 mm from each other, stretched between additional posts or straining posts and covered with weld mesh as shown on the drawings or directed by the Engineer.

PCB-3.8 Existing fences

Where the new fence joins an existing fence, the new fence shall be permanently tied to a straining post erected at the terminal of the existing fence. Existing fences that must be removed to a new location shall be dismantled. Any usable material arising from the dismantling of the fences and declared as unsuitable by the Engineer as suitable for re-use shall be neatly stacked at approved locations in accordance with the instructions of the Engineer.

Apart from material obtained from the dismantling of existing fences, the Contractor shall provide sufficient new material to ensure that moved fences are of the same standard as that required for new fences, irrespective of the quality of the material being re-used.

PCB-3.9 Installing gates

Gates shall be installed at the places indicated by the Engineer or as per drawing. The gates shall be hung on gate fittings in accordance with the requirements shown on the drawings. At pedestrian and security fences the double swing gates shall not leave a gap of more than 40 mm between them when closed and other gates shall not be further than 100 mm from the gate post when closed.

PCB-3.10 Pedestrian gates

Pedestrian open gates shall be installed at places indicated by the Engineer. The access provided by these gates shall be large enough to allow one person at a time to pass through the gate. No cattle or vehicles shall be able to pass through this gate. The gate shall be constructed with palisade as shown on the drawings.

PCB-3.11 General requirements

The completed fence shall be plumb, taut, true to line and ground contour, with all posts, standards and stays firmly set. The height of the lower fencing wire above the ground at posts and standards shall not vary from that shown on the drawings by more than 25 mm. Other fencing wires shall not vary by more than 10 mm from their prescribed relative vertical positions.

The following additional requirements apply to security fencing:

(a) The wire mesh shall be 2,5 mm dia. with 50 mm square openings.

(b) The straining wire shall be the high tension wire equivalent or ordinary 4 mm straining wire.

(c) After the straining wires have been tensioned, the excess piece of the tension bolts at the gates shall be sawn off and rivetted against the nut.

(d) Straining wire shall be fixed to all posts and the mesh fence shall be fixed to all straining wires at intervals of less than one metre.

(e) All steel posts shall be sealed at the top.

(f) The mesh shall be fixed to the outside of the security area.

(g) All damaged galvanizing shall be repaired in accordance with the requirements of SABS 763 at the cost of the Contractor.

(h) The following minimum applications of zinc galvanizing shall apply:

(i) Weld mesh and diamond mesh - SABS 675 of 1971 - 75 gm/m^2
(ii) Straining wire - SABS 935 of 1969 - 140 gm/m2
(iii) Binding wire - SABS 935 of 1969 - 120 gm/m^2
(iv) Posts, standards and struts (if applicable)- SABS 763 of 1971 - 305 gm/m^2 (type B2)
(v) Tension bolts - SABS 763 of 1971 - 380 gm/m2 (type C1)

(j) All wooden components shall be properly sealed with a bitumen or similar coat.

PCB-4. **MEASUREMENT AND PAYMENT**

PCB-4.1 Clearing line of fence 2 m wide Unit: metre (m)

The unit of measurement shall be the metre of fence line cleared as specified.

The tendered rate shall cover the cost for the removal of all grass, shrubs, stones, trees (if necessary), structures and other obstructions, and the disposal thereof as specified. The dismantling and removal of existing fences where applicable shall be measured separately.

PCB-4.2 Supply and erection of palisade fence (specify) Unit: metre (m)

The unit of measurement shall be the metre of new fence erected on the fence line. Each fence line shall be measured separately.

The tendered rate shall include full compensation for the erection of the fence complete as shown on the drawings and as specified including all labour, plant, installation of corner and straining posts include concrete for all tube posts.

The palisade fence must meet the following minimum specifications.

- 40X40X2/3mm Angle Iron
- 40X40X2/2 2.5/3mm Angle Iron Crossbar
- 50X50 or 76X76 SQR Tube Post
- ABS Plastic Cap
- M8 Antivandal Nut and Bolt
- 16 pales per 3m Panel

Material: low carbon steel, stainless steel.
Surface treatment: galvanized, powder coated.
Fence panel length (post centre): 2.75 m.
Maximum pale spacing: 155 mm for corrugated pales; 135 mm for angle pales.
Corrugated pale type: W section pale, D section pale.
Accessories: fishplates, post clamps, post bracket, bolts and nuts.

PCB-4.3 Corner and straining posts including the necessary stays Unit: number (No)

All straining posts erected in accordance with the maximum specified spacing or such lesser spacing as authorised by the Engineer and all end posts shall be measured. Gate posts for new gates shall not be measured separately (Refer to PCB-4.5). The two straining posts to form the V-shape on a pedestrian gate shall not be measured as separate straining posts but form part of the pedestrian gate.

The tendered rate shall cover the cost of all labour, plant and material to supply and erect the corner and straining posts as specified. The tendered rate shall also include the cost of sealing of all wooden components as specified on the drawings.

PCB-4.4 Extra over item PCB-4.3 for posts in hard rock Unit: number (No)

The unit of measurement shall be the number of posts installed in hard rock where holes have to be made by drilling and/or blasting where excavation by hand or pneumatic tools cannot be done economically. The stays shall not be measured separately.

The rate shall cover the extra cost of forming the post hole as well as the stay hole in rock.

PCB-4.5 New gates Unit: number (No)

The size and type shall be stated in the schedule of quantities.

The unit of measurement is the number of new gates erected.

The tendered rate shall cover the cost for the procuring and furnishing of all material, including gates, gate posts, hinges, bolts, concrete and straining wire, and the erection of the gates as specified and as shown on the drawings.

PCB-4.6 New Pedestrian Gates Unit: number (No)

The unit of measurement is the number of new pedestrian gates erected complete.

The tendered rate shall cover the cost for the provision of all materials (palisade, nuts, bolts, wire, etc.) in order to construct the pedestrian gate as shown on the drawings.

PCB-4.7 Dismantling and removal of existing fences Unit: metre (m)

The unit of measurement shall be the metre of existing fence or gate dismantled and removed on the instruction of the Engineer.

The tendered rate shall include full compensation for taking down the existing fences and gates, coiling the wires, rolling the netting into rolls, transporting the material to a designated site and stacking the material neatly.

***PARTICULAR SPECIFICATION PDD*:**

PROTECTIVE COATING SYSTEM FOR MECHANICAL EQUIPMENT AND PIPE INSTALLATIONS IN WATER AND SPACE WASTE-WATER TREATMENT PLANTS

PDD-1 SCOPE

This specification covers the coating systems for corrosion protection of mechanical equipment and pipe installations in pump stations and in water and waste water treatment plants.

The specification covers coatings for equipment or elements of equipment operating below or above water.

PDD-2 INTERPRETATIONS

PDD-2.1 Supporting Specifications

Where this specification is require for a project, the following specifications shall, inter alia, form part of the contract document:
Project specifications

SABS 1200 L
SABS 1200 LK
SABS 1200 LM
SABS 1200 LN

PDD-2.1.2 Reference is made to the latest issues of the following standards:

SABS 1217 The production of painted and powder coated steel pipes.

SABS Method 767 Cleanliness of blast-cleaned steel surfaces for painting (assessed by pictorial standards).

SABS Method 769 Cleanliness of blast-cleaned steel surfaces for painting (assessed by freedom from dust and debris).

SABS Method 772 Profile of blast-cleaned steel surfaces for painting (determinal by micrometer profile gauge)

PDD-3 DEFINITIONS

For the purpose of this specification, the following definitions shall apply:

(b) Coat : A single layer of corrosion protection material.

(c) Coating System : The method and degree of surface preparation, the type of coating, the number of coats and their thickness, the method of application of the coats and the requirements of the completed system.

(d) Disbonded area : An area of lining of coating that initially did adhere to the steel substrate after application, but which subsequently became loose from the substrate as a result of mechanical, chemical or other action.

(e) Unbonded area : An area of lining or coating which at not stage adhered to the steel substrate.

(f) Lining : Refers to the internal coating of pipes and specials.

PDD-4 MATERIALS

PDD-4.1 General

The coating system described in this specification is based on an epoxy generic and “chalking” of areas exposed to sunlight can be anticipated. For this reason, ultra-violet light resistant polyurethane enamel is prescribed as a finishing coat for such areas.

Product names are quoted in this specification, but approved equivalent products may be used.

PDD-4.2 Primers

For equipment operating below water and above water:
KSIR-88, a solvent-borne polyamide cured epoxy by Plascon (or equivalent), shall be used.

(b) For motors, pumps and pipe installations in pump stations:
Plascon Epimide Red Oxide/Zinc Chromate Primer, product code EPD 41 (or equivalent), and Plascon Epilite Hifill Epoxy Primer, product code EPD 325/326 (or equivalent) shall be used.

PDD-4.3 Intermediate Coats

(a) For equipment operating below water and above water:

KSIR-88, a solvent-borne polyamide cured epoxy by Plascon (or equivalent), shall be used.

(b) For motors, pumps and pipe installations in pump stations:
Plascon Epilite Hifill Epoxy Primer, product code EPD 325/326 (or equivalent) shall be used.

(c) For specialised installations or repairs to existing epoxy coatings:
Plascoguard Copon Hycote 151, product code JHC 21 (or equivalent).

PDD-4.4 Finishing Coats

Polyurethane Acrylic Enamel or Aliphatic Polyurethane shall be used as finishing coat for all coating systems described hereafter.

(a) On previously galvanised surfaces:
On all galvanised and aluminium surfaces, first clean with Plascon Galvanised Iron Cleaner, product code GIC 1 (or equivalent), to obtain a water break free surface and rinse with clean water. For finishing coat, use Plascothane Industrial PU Enamel, product code UP series (or equivalent).

(b) Colour coding:
Final surface finish for different components must be done according to the colour code as Part 3 X of the Mechanical Project Specification.

PDD-5 APPLICATION

PD-5.1 Surface Preparation

The steel surfaces to be coated shall have all projections, sharp edges, laminations and tool marks removed to provide a smooth surface. All oil and grease shall be removed using organic solvent or emulsion alkali cleaners. Blast cleaning media and air used for blowing out dust and debris shall be free from oil and grease.

The surfaces to be coated shall be abrasive blast cleaned to meet the following requirements:

All surfaces to be coated shall be abrasive blast cleaned to grade Sa 2½ mm, Swedish Standard SIS 05 59 00, for surfaces above water and to grade Sa 3 mm for surfaces below water (tested in accordance with SABS Test Method 767).

Blast cleaning shall utilise a grit abrasive of a type and size to give profile depth of 25 – 50 microns for surfaces above water and 500 – 100 microns for surfaces below water.

Residual dust and debris shall not exceed 0,2% when measured in accordance with SABS Test Method 769.

Blast-cleaning of motors and gearboxes will only be allowed in the factory before assembly. After assembly and installation of motors, pumps and gearboxes inside the pump station, only hand and power tool cleaning will be allowed. All welds, crevices, etc. shall be properly cleaned and no scars, ridges, pinnacles or structural damage shall be caused to piping and equipment surfaces.

Sharp tools shall not be used for hand cleaning and where possible, abrasive pads shall be used. Wire brushes shall not be allowed for final surface cleaning, and burnished or polished finishes will not be allowed. The acceptance standard for hand and power tool cleaning shall be in accordance with Swedish Standard SIS 05 59 00 ST3.

PDD-5.2 Application of Coatings

Primers and intermediate coats shall be applied by brush, roller or preferably airless spray. The recommended method of application for the finishing coat is by airless or conventional spray. Dry film thickness for the various coats shall be as specified hereafter.

All coats shall be applied in an even continuous film of uniform thickness as specified, completely coating corners, welds, crevices, etc.

Runs and drips shall be avoided and each coat shall be free from pinholes, bubbling, holidays, brush marks, solvent retention or any other defect. Prior to the application of a coat, any damage or defect in a previous coat shall be rectified n accordance with the recommendations of the manufacturer or as described hereafter.

Materials from different manufacturers shall not be mixed in any coating system. Thinning of coating materials will only be allowed in accordance with the manufacturer's prescriptions where absolutely necessary to obtain proper application characteristics.

No coating shall be force-dried or applied under conditions that will cause blistering, cracking, pores, wrinkling, or any other film defect that will adversely affect the performance of the coating.

No coating shall be applied during fog, mist, rain or when there is a likelihood of such weather conditions occurring before the coating will have had time to dry or cure. No coating shall be applied on metal surfaces less than 2°C above dew point or when humidity in the immediate vicinity is greater than 85%. Two-pack catalysed coatings shall not be applied when the ambient temperature is below 10°C or above 40°C unless otherwise recommended in writing by the coating manufacturer.

Blast-cleaned surfaces shall be coated with primer within the following times:

Maximum time interval between cleaning and coating\

Ambient Relative Humidity	Maximum Time (Hours)
Below 50%	6 hours
50 – 70%	4 hours
70 – 85%	2 hours
> 85%	Coating not permitted. Re-blast and coat when humidity is below 85%.

PDD-5.3 Coating System

PDD-5.3.1 Coating system for equipment operating under water

The coating system consists of four coats of KSIR-88 solvent-borne polyamide cured epoxy and a finishing coat of a two-pack Polyurethane or an Aliphatic Polyurethane.

The four coats of KSIR-88 Coating shall be applied to a dry film thickness of 65 to 85 micron per coat to achieve a total dry film thickness of 300 – 350 micron. The first and third coats shall be pale oxide (JYA2) and the second and fourth coats red oxide (JYA1). Particular care shall be taken in respect of overcoating times as specified by the coating manufacturer.

The Polyurethane finishing coat shall be applied to a dry film thickness of 35 micron within 24 to 72 hours after the final coat of KSIR-88 has been applied, all strictly in accordance with the coating manufacturer's specifications.

The colour of the finishing coat shall be to the Engineer's approval.

PDD-5.3.2 Coating system for equipment operating above water

The coating system consists of three coats of KSIR-88 solvent-borne polyamide cured epoxy and a finishing coat of Polyurethane Acrylic Enamel.

The three coats of KSIR-88 Coating shall be applied to a dry film thickness of 65 – 85 micron per coat to achieve a total dry film thickness of 200 to 250 micron. The first and third coats shall be red oxide

and the second coat a pale oxide in colour. Particular care shall be taken in respect of overcoating times as specified by the coating manufacturer.

The finishing coat of Polyurethane Acrylic Enamel shall be applied to a dry film thickness of 35 micron within 24 to 72 hours after the final coat of KSIR-88 coating has been applied, all strictly in accordance with the coating manufacturer's specifications.

PDD-5.3.3 Coating system for pumps, motors and pipe installations in pump stations

The coating system consists of the following four coats:

The first coat shall be Plascon Epimide Red Oxide/Zinc Chromate Primer or equivalent applied to a dry film thickness of 35 micron.

The second (intermediate) coat shall be Plascon Epilite Hifill Epoxy Primer (or equivalent) applied to a dry film thickness of 40 micron.

The third (first finishing) coat shall be Polyurethane Acrylic Enamel or an Aliphatic Poyurethane, applied to a dry film thickness of 35 micron.

The fourth (second finishing) coat shall be Polyurethane Acrylic Enamel or Aliphatic Polyurethane, applied to a dry film thickness of 25 micron.

The total dry film thickness for the system shall nowhere be less than 125 micron.

PDD-5.3.4 Coating system selection

Mechanical equipment in water and wastewater treatment plants is normally designed to have a steel or concrete support structure above the water level connected to elements in the splash zone or elements below water level. The coating systems described in PDD-5.3.1 above is also applicable to the elements in the splash zone or elements extending from the support structure to below the water surface.

Where there is a differentiation between submerged and non-submerged areas on the same element or item, the non-submerged area shall receive the full 4-coat KSIR-88 coating system with a two-pack or Aliphatic Polyurethane finishing coat as specified for submerged areas in PDD-5.3.1.

PDD-5.3.5 Coating system on proprietary equipment

The coating system on proprietary equipment differing from the coating systems specified above, will be subject to the Engineer's approval. Where such coating system is regarded as inadequate, a specially designed overcoating system may be required.

PDD-5.4 Remedial Procedures

PDD-5.4.1 General

Completed or partly completed coating systems, which are damaged or show any defects, shall be thoroughly examined, and all such defective areas shall be rectified and fully restored to its original condition.

PDD-5.4.2 Coating damage not exposing steel surface

The damaged areas not exposing the steel surface shall be washed down with a water-emulsifiable or water-rinsable solution (Plascon Aquasolve Degreaser or equivalent) to remove all contamination, followed by copious rinsing, using clean fresh water and allowed to dry before re-coating the damaged area to the original condition.

PDD-5.4.3 Coating damage exposing steel surface

The damaged area shall be thoroughly cleaned using mechanical or hand wire-brushes and/or abrasive paper to remove all loose paint and foreign matter to achieve a bright metal surface. The sou8nd coating adjacent to the damaged area shall be feathered back to firm paint for a minimum distance of 25 mm, using abrasive paper.

The feathered-back existing coating shall be solvent-wiped with epoxy thinners (Plascon product code EPT or equivalent) before re-coating the damaged area with the coating system specified for the particular element or item.

PDD-5.4.4 Inadequate coating thickness

When the dry film thickness is less than the thickness specified, extra material shall be applied. The surface shall be thoroughly cleaned using mechanical or hand wire-brushes and/or abrasive paper prior to the application of the extra material.

PDD-5.4.5 Repair of pinholes

If pinholes are few and local, the area shall be rubbed down with abrasive paper and an additional coat or coats shall be applied by brush.

If the affected areas are extensive, the coating of the areas shall be removed and re-coated at the contractor's expense.

PDD-6 TESTING

The continuity of all coatings on immersed equipment shall be tested for pinholes (holiday detection) at 90 V and 2 mega ohm. The pinhole detection equipment shall be calibrated against a coated steel panel to provide minimum 5 V per micron of average film thickness. The test equipment shall be a low-pulse direct-current detector of an approved type. The equipment manufacturer's recommended and approved procedure for the calibration and use of the equipment shall be followed.

PDD-6.1 Holiday Inspection

Every pipe shall be inspected by means of a suitable low voltage holiday instrument equipped with wet sponge electrode. There shall be no holidays on any area tested.

PDD6.2 Thickness

Shop applied lining and coating

The film thickness on the first pipe and thereafter on at least one pipe selected at random from every day's production, but not less than one pipe out of every ten pipes, shall be measured non-destructively by an approved eddy current instrument. At least four readings at equally spaced intervals around the circumference, approximately 300 mm from each end of the pipe, shall be taken. The first reading shall be over the weld bead. When practicable, an additional four readings at equally spaced intervals around the circumference in the centre of the pipe shall be taken. The minimum thickness shall not be less than 300 micrometres over any area including weld beads. The Inspectorate may at their discretion, supplement the above test by checking wet film thickness on any or all pipes during application of the epoxy resin.

In-situ applied lining

The lining thickness shall be tested by means of an approved eddy current or magnetic instrument. At least four readings shall be taken at equally spaced intervals around the pipe circumference at any test point. The first reading shall be over the weld bead. The minimum thickness over any area, including weld beads, shall not be less than 300 micrometers.

PDD-7 MEASUREMENT AND PAYMENT

No additional payment will be made for the specified protective coating systems as the coating forms part of the mechanical equipment and pipe installations specified for the contract. Equipment with non-approved coating systems will be regarded as not conforming to the specifications.

***PARTICULAR SPECIFICATION PME*: MOTOR STARTERS**

PME: MOTOR STARTERS

PME-1 SCOPE

This Specification covers starters for the A.C. induction motors described in Particular Specification PMD, and is intended to operate in the same range of environmental conditions.

The starter includes the following types:

(a) Direct-on-line starters
(b) Star-delta starters
(c) Liquid-resistor starters
(d) Capacitor starters

PME-2 STANDARDS

PME-2.1 Starters shall comply with the specified requirements, the requirements of the Local Supply Authority and the requirements of the specific system.

PME-2.2 Contactors and starters shall comply with the relevant parts of BS 775, BS 5424 or VDE 0660 Section 14, or IEC 158 categories AC3 except in cases where a plugging duty is required in which case category AC4 shall apply. In cases where level switches or similar ON-OFF controls are required, inherent timelags or other protection methods shall be incorporated in the control circuitry to inhibit chatter or shuttle switching of the contactor at the change-over point.

PME-3 ISOLATION

It shall be possible to isolate electrical driven mechanical equipment by means of either of the following:

PME-3.1 An isolator on the motor.

PME-3.2 A starter with a positive hand-operated switching-off control which complies with the requirement of an isolator mounted within 2 m of the equipment.

PME-3.3 Where the starter is located further than 2 m away from the motor a separately mounted load-break isolator shall be installed within a distance of 2 m from the motor. The isolator shall be capable of interrupting the current of the motor with a stalled rotor. Alternatively, a cut-out push-button control may be mounted within 2 m of the motor provided that the starter control switch is lockable in the "OFF" position and that this arrangement is acceptable to the supply authority.

PME-3.4 In addition to the above, each circuit shall be provided with a loadbreak isolator, circuit-breaker or combination fuse switch on the control panel. These switches shall be capable of interrupting the current of a motor with a stalled rotor.

***SPECIFICATIONS PLZ*: VALVES, PRVs, FLOW LIMITERS AND METERS**

CONTENTS

PARTICULAR SPECIFICATIONS PLZ: VALVES, PRVs, FLOW LIMITERS AND METERS

PLZ-1 SCOPE

This Particular Specification refers to clause 3-10 (valves) of SABS 1200 L (Medium-Pressure Pipelines) and covers gate, air, reflux, butterfly, diaphragm level control and flow limiter valves, hydrants, pressure reducing valves, meters, strainers and pipe specials for use in medium-pressure pipelines including valve and meter chambers.

PLZ-2 INTERPRETATION

PLZ-2.1 References

The interpretation clause of SABS 1200 L: Medium-Pressure Pipelines and the interpretation clauses in the applicable standards listed below, shall apply:

SABS 664	Cast iron gate valves for water works
SABS 226	Stop cocks, brass, screw-down type
SABS 1123	Steel pipe flanges
BS 5728 / ISO 4046	Water meters

PLZ-2.2 Application

This particular specification contains clauses that are applicable specifically to this contract for the supply and reconditioning of valves, PRV's, flow limiter valves, meters and strainers.

PLZ-3 MATERIALS, TESTING AND HANDLING

PLZ-3.1 General

Valves shall be capable of withstanding the applicable test pressures specified in SABS 664 and as indicated in this specification.

Satisfactory temporary end covers shall be provided to protect threads, flanges and prepared ends of valves from damage during transportation and handling on site.

Valves shall be so transported, stored and handled as to prevent damage. Valves damaged in any way shall be removed from the Site.

All valves and appurtenant fittings shall be for the use in medium pressure pipelines with a designed useful life of 45 years under operating conditions. Valves shall be guaranteed for a period of 5 years from the date of delivery.

All valves shall be supplied complete with bolts, nuts, gaskets or rubber rings for joining. Valve bodies shall be subjected to a close-end test pressure of 1.5 times the design pressure, unless stated otherwise. Test pressure shall be maintained for 5 minutes and the valve bodies shall be watertight in all aspects.

The size and pressure rating (class) of the valve will be cast into the body of the valve.

PLZ-3.2 Gate valves

PLZ-3.2.1 General

All gate valves shall comply with the requirements of SABS 664 and shall carry the SABS mark.

The following are specific requirements for this contract, for all gate valves:

Spindle	Stainless steel to BS 970 Gr 420S29, non-rising internal, clockwise closing
Spindle nut	Bronze Gr LG2
Spindle caps	Cast iron
Valve body, bonnet, stuffing box, gate, yoke, gland	Waterworks pattern Cast iron to SABS 1034 Gr 250/BS 1452 Gr 220 Ductile iron to SABS 936 SG42/BS 2789 Gr 420/12
Valves ends	Double flanged to SABS 1123 Table 1600/3 unless otherwise specified
Thrust collars	Ball thrust collars for valves where specified

Gate shall completely clear the bore of the valve in the fully open position.

The direction of closing shall be clearly marked on the bonnet of the valve.

Test certificates shall be issued with all valves supplied. Valves shall be drip-tight from zero to maximum working pressure under test conditions.

Test and working pressures are:

Hydrostatic test pressure : Body 3,2 MPa
Seat 1,6 MPa or 2,5 MPa as specified

Maximum working pressure
for liquids up to 70°C : 1,6 MPa or 2,5 MPa as specified

PLZ-3.2.2 Wedge Gate Valves

Valve seat and gate rings shall be of bronze to BS 1400 LG2.

Valves, except flange faces shall be coated externally and internally with SNK10 self-etching primer or similar approved, followed by one or more coats of fusion bonded epoxy (FBE) material to give a total film thickness of at least 250 microns all applied in accordance with the manufacturer's specifications.

Valves where specified shall be supplied with fully enclosed, grease-packed, single-train spur gear boxes with a 3:1 or 4:1 ratio as specified.

Where required, bronze gate guides and shoes shall be fitted as additional.

Where required, integral mounted by-pass assemblies shall be fitted as additional.

PLZ-3.2.3 Knife Gate Valves

Valve body to be cast iron with soft rubber lining. Spindle and blade to be manufactured from stainless steel (AISI 304L). Seals to be re-packable transverse made from Nitrite rubber with PTFE scrapers, to withstand solid particles and grit associated with wastewater and sludge.

Hand wheel to be rising spindle type. Valve to be installed vertically at all times.

PLZ-3.2.4 Resilient Seal Valves

Valve bodies shall have unobstructed, pocket-free, bores i.e. no seating protrusions or gate well, with inclined seats and gate guides to eliminate deposits in the valve body.

The spindle seal shall have at least two Nitrile Butadine rubber to DIN 3770 o-rings located in a corrosion-resistant housing and a wiper ring to prevent ingress of dirt. A back seal shall permit replacement of spindle seals under pressure, with the gate in the fully open position.

The cast iron gate shall be fully covered with a Nitrile Butadine rubber sheath fully bonded to the gate by vulcanising.

Valves shall be coated with a fusion-bonded epoxy coating of minimum thickness 200 microns.

PLZ-3.2.5 Auxiliary Fittings

Wedge gate valves of 300 mm diameter and larger shall be fitted with the following auxiliary fittings:

(i) Drain Plugs

300 mm diameter valves and larger shall be supplied with gunmetal drain-plugs screwed into the lowest point of the valve and the valve body shall be suitably drilled and tapped to accept the drain-plug. The plug must be in position when the test pressure is applied.

(ii) Ball Bearing Thrust Collars

300 mm diameter valves and larger shall be fitted with ball-races on the top and bottom of the thrust collars. The ball-races shall be totally enclosed in a grease-packed cover, which shall be sealed to prevent the egress of grease. Provision must be made for lubricating the ball-races and the lubrication arrangement shall allow for re-greasing while the valve is under pressure.

PLZ-3.2.6 Flange Drillings

Flanges shall be drilled and bolted in accordance with the requirements of 1000/3, 1600/3, 2500/3 and 4000/3 of SABS 1123, as specified on the drawings.

PLZ-3.3 Air valves

PLZ-3.3.1 General – Water works anti-shock and air release

Air valves shall be cast-iron or stainless steel bodied and of the single chamber design with cylindrical solid polymer control floats incorporating an anti-shock design during high velocity air discharge.

The orifice plate, internals and body bolts shall be of stainless steel. All components of the valve shall be easily replaceable. All internals made of stainless steel that will be in contact with the fluid will be lined or coated and lined with a polyurethane paint to prevent cathodic action.

The design of the valve shall be such as to preclude the loss of water or the possibility of the float being blown shut by the passage of air when the accumulation of air in the pipeline is being released.

The valves shall also be positive in action to admit a free and full supply of air when the pipeline is being emptied or when operating conditions demand.

Valves shall respond to the presence of accumulated air under normal working conditions by discharging it through a small orifice at any pressures within the specified design range.

Valves shall react immediately to pipeline drainage by full opening of the large orifice to allow unobstructed air intake. Valves shall not exhibit leaks or weeping past the large orifice seal at the maximum working pressure.

PLZ-3.3.2 Sewage air release and vacuum break valves

Materials, construction and design

The Sewage Air Release and Vacuum Break Valve shall consist of a compact tubular all stainless steel fabricated body, hollow direct acting float and solid large orifice float in HDPE – stainless steel nozzle and woven dirt inhibitor screen, nitrile rubber seals and natural rubber seat. All internals made of stainless steel that will be in contact with the fluid will be lined or coated and lined with a polyurethane paint to prevent cathodic action.

The valve shall have an integral 'Anti-surge' Orifice mechanism, which shall operate automatically to limit surge pressures rise or shock induced by closure to less than 2 x valve rated working pressure.

The intake orifice area shall be equal to the nominal size of the valve, i.e. a 150 mm (6 ") valve shall have a 150 mm (6 ") intake orifice.

Large orifice sealing shall be effected by the flat face of the control float seating against a nitrile rubber 'O' ring housed in a dovetail groove circumferentially surrounding the orifice.

Discharge of pressurised air shall be controlled by the seating and unseating of a small orifice nozzle on a natural rubber seal affixed into the control float. The nozzle shall have a flat seating band surrounding the orifice so that damage to the rubber seal is prevented.

The valve construction shall be proportioned with regard to material strength characteristics, so that deformation, leaking or damage of any kind does not occur by submission to twice the designed working pressure.

Connection to the valve inlet shall be facilitated by flanged ends conforming to PN10, 16 or 25 ratings of BS 4504 or SABS 1123 Standards or, ANSI B16, 1 Class 125 and Class 250 and ANSI B16. 5 Class 150 and Class 300 Standards.

Flanged ends shall be supplied with the requisite number of stainless steel screwed studs inserted for alignment to the specified standard. Nuts, washers or jointing gaskets shall be excluded.

(b) Operation

Prior to the ingress of liquid into the valve chamber, as when the pipeline is being filled, valves shall vent through the large orifice when sewage/effluent approach velocities are relative to a transient pressure rise, on valve closure, of < 2 x valve rated pressure.

At higher sewage/effluent approach velocities, which have a potential to induce transient pressure rises > 2 x valve rated pressure on valve closure, the valve shall automatically discharge air/gas through the 'Anti-shock' Orifice and reduce sewage/effluent approach velocity, so that on closure a maximum transient pressure rise of < 2 x valve rated pressure is realised.

Valves shall not exhibit leaks or weeping of liquid past the large orifice seal at operating pressures of 0.5 bar (7.3 psi) to twice rated working pressure.

Valves shall respond to the presence of air/gas by discharging it through the small orifice at any pressures within a specified design range, i.e. 0.5 bar (7.3 psi) to 10 bar (150 psi) and shall remain leak tight in the absence of air.

Valves shall react immediately to pipeline drainage or liquid column separation by the full opening of the large orifice so as to allow unobstructed air intake at the lowest possible negative internal pipeline pressure.

PLZ-3.3.3 Working Pressure

The working pressure rating of the air valves shall be to suit the application or as stated in the Schedule of Quantities.

PLZ-3.3.4 Isolating Valves

(i)Air valves shall be supplied complete with isolating valves entirely reliable in operation for the shutting down of the air valve for its complete inspection and removal and replacement of the floats or other parts as required.

(ii)The isolating valve shall be a double-flanged resilient seal valve to suit the inlet stem to the air valve, all as specified in PLZ-3.2.3 but with a hand wheel and the direction of rotation of the isolating valve shall be anti-clockwise closing.

PLZ-3.3.5 Flanges

Flanges shall conform to the dimensions and drilled in accordance with 1000/3, 1600/3 or 2500/3 of SABS 1123, whichever is specified, to suit working pressures.

Where flanges are supplied with inserted studs, these shall be of stainless steel.

PLZ-3.4 Hydrants

Hydrant valves and outlet connectors shall comply with the requirements of SABS 1128: Fire Fighting Equipment, Part I : Components of Underground and Aboveground Hydrant Systems. Any deviations or additions will be covered in the Project Specifications if applicable.

PLZ-3.5 Butterfly Valves

PLZ-3.5.1 General

Butterfly valves shall be of the double-flanged, lugged or wafer type.

PLZ-3.5.2 Opening and Closing

All valves shall be capable of being opened or closed by hand under an unbalanced pressure equal to the design pressure without any difficulty. The disc shall close with a positive action with no possibility of slamming shut during any stage of the closing operation and the valve shall be capable of operating at any opening without variation of disc position or flutter of the disc.

The direction of spindle rotation for valve closing shall be anti-clockwise.

PLZ-3.5.3 Class of Valve

The class of valve shall be as stated in the Schedule of Quantities and shall be Class 16 (maximum working pressure of 1600 kPa) or Class 25 (maximum working pressure of 2500 kPa).

PLZ-3.5.4 Valve Body

The valve body shall have integral hubs for housing shaft bearings and seals.

The valve body shall have integral disc over travel stops to prevent the disc from rotating in the wrong direction and to protect the seat from damage if actuators are incorrectly adjusted.

PLZ-3.5.5 Discs

Valves of Class 16 (1600 kPa) and greater shall have offset and eccentric discs to provide uninterrupted 360° seating and to prevent the disc edge from rubbing against the seat in the top and bottom of the shaft areas.

The disc shall be a single casting having a streamlined shape with smooth continuous surfaces so that good hydraulic stability is assured even in turbulent flows.

PLZ-3.5.6 Seals and Seats

Seals shall be of the resilient type with non-weathering, non-sticking, long life properties. The profiles of the seats shall be smooth and continuous and shall provide adequate "lead in" for the resilient seal during closure of the disc to prevent excessive seating torque requirements.
Resilient seals shall be fully locked-in, removable and replaceable. All securing elements shall be of stainless steel. Valve seats shall be readily removable and replaceable on site.

PLZ-3.5.7 Shafts

The disc shafts or stub shafts shall be of high-strength stainless steel or equivalent and shall be attached to the valve disc by means of stainless steel securing elements. Shafts shall be continuous or may be of the stub-shaft type. In the case of the stub-shaft type, each stub shaft shall extend into the disc hub for a distance of at least 1,5 times the shaft diameter.

All keys, dowel pins and taper pins used to attach the shaft to the disc shall be mechanically secured. The shaft shall be so sealed that the only two wetted parts shall be the disc and seat.

PLZ-3.5.8 Bearings

Class 16 (1600 kPa) valves or valves with diameter of 350 mm or bigger shall be fitted with two-way adjustable thrust bearings in order to permit precise disc-to-seat positioning at all times.

Positive bearing retention shall also be provided so that the bearing will not shift under operating conditions.

The valve shall be capable of being installed and operated in any position.

The bearings shall be of the self-lubricated type.

PLZ-3.5.9 Stuffing Boxes

Stuffing box assemblies shall be such that the packing can be adjusted or replaced under pressure without removing the valve from the pipeline.

PLZ-3.5.10 Actuators

Actuators shall be enclosed in weatherproof enclosures.

Actuators shall be self-locking and capable of holding the disc in any fixed position for any extended period of time.

Safety measures (such as shear pins) shall be built into the actuator in order to prevent damage to the valve if excessive force is applied to the handwheel in the full open or closed position.

All actuators shall be equipped with position indicators, adjustable travel stops and indications of the "open" and "closed" positions.

The gears shall be grease-lubricated with grease-nipples located on the outside of the enclosure.

PLZ-3.5.11 Flange Drillings

Flanges shall be drilled and bolted in accordance with the requirements of table 1000/3, 1600/3 or 2500/3 of SABS 1123. Precision bolts and nuts are not required.

PLZ-3.6 Diaphragm Valves

The valve must be able to handle sludges, rags and grit as expected in waste treatment works. The valve body must be designed to minimise turbulence and give 100% leak tight closure (Saunders type KB straight-through bore or similar approved).

The valve must have a smooth bore and minimise wear from abrasion and allow for rodding when sludges set in the pipeline.

The valve operating mechanism must be sealed from service and atmosphere.

The diaphragm must be manufactured from tough, resilient type natural rubber (Hercules rubber or similar) of sufficient grade to handle abrasives, acids and alkalis as expected in sewage works.

The valve body to be cast iron with sufficient corrosion and erosion protection (soft rubber lined) to last the useful life of the valve.

PLZ-3.8.2 Main Valve

The main valve shall be hydraulically operated, pilot activated automatic control valve for pressure reducing service. The valve consists of only two parts: a stainless steel body and an elastomeric liner. The valve will be positioned in line and be controlled via an external pilot control valve.

This valve and control system shall be similar in all respects to Cla-Val Rollseal Model 790-01.

PLZ-3.8.3 Material Specification

Valve Size	:	50 – 300 mm
Main Valve Body	:	316 Stainless steel, investment cast.
End Detail (50 to 100 mm)	:	Wafer pattern
End Detail (150 to 300 mm)	:	SABS 1123 Table 1600/3 or 2500/3 as specified
Pressure Rating	:	1600 kPa or 2500 kPa as specified
Temperature Range	:	0 - 70°
Liner Material	:	Natural rubber, 65 durometer
Liner Retainer	:	316 Stainless steel
Coating	:	Fusion bonded Epoxy

Desired Options:
(i) X43 “y” Strainer or equivalent on pilot piping.
three ball valves on pilot piping, inlet, outlet and line to cover chamber.
63 mm dia. pressure gauge, glycerin filled as WIKA or equivalent, fitted with 10 mm stainless steel ball valve on tee piece on inlet and outlet pilot piping.

PLZ-3.8.4 Pilot Control System

The pressure reducing pilot control shall be a direct-acting, adjustable, spring-loaded, normally open, diaphragm valve designed to permit flow when controlled pressure is less than the spring setting. The pilot control is held open by the force of the compression on the spring above the diaphragm and it closes when the delivery pressure acting on the underside of the diaphragm exceeds the spring setting. The pilot control system shall include a fixed orifice. No variable orifices shall be permitted. The pilot system shall include an opening speed control on all valves 100 mm and smaller.

Three-way pilot controls will not be accepted if the connection of TECHNOLOG “Autowat” or “Ecowat” controllers is specified.

The pilot control shall have a second downstream sensing port which can be utilized to install a pressure gauge.

A full range of spring settings shall be available in ranges of 0 to 3000 kPa.

A direct factory representative shall be made available for start-up service, inspection and necessary adjustments.

PLZ-3.5.5 Material Specification for Pilot Control

Pressure Rating	:	1600 kPa or 2500 kPa as specified
Trim	:	Stainless Steel
Rubber Material	:	Buna-N
Tubing and Fittings	:	Brass compression fittings with copper tubing
Adjustment Range	:	200 to 2000 kPa or 100 to 500 kPa
Operating Fluids	:	Water
Desired Options	:	-

PLZ-3.9 Controllers

PLZ-3.9.1 General

Controllers shall be used where specified to reduce pipe leakage through improved pressure control.

Two types of controller are specified and for ease of reference the trade names of suitable controllers have been used in the specification. However, similar controllers that comply in all respects with the Technolog Autowat and Technolog Ecowat controllers may be used subject to the Engineer's approval.

PLZ-3.9.2 Control

"AUTOWAT" or similar approved controller:
Manual control: Manually set outlet pressure
Time profile: Modulates pressure with respect to time
Flow profile: Modulates pressure with respect to flow

"ECOWAT" or similar approved controller:
Time profile: Modulates pressure with respect to time
Flow profile: Modulates pressure with respect to flow

PLZ-3.9.3 Operating Requirements

Controllers shall be capable of continuous operation using batteries (without an external power supply) for a period in excess of two years.

The "Autowat" controller shall take pressure readings at intervals of 0.1 seconds and have a resolution of 0.5% for a pressure range of 0 to 2000 kPa. Electronic data retrieval shall be possible from a 32-kilobyte solid state memory.

The "Ecowat" controller shall have a maximum operating pressure of 1300 kPa and provide regulation in the range of 0 to 800 kPa.

PLZ-3.9.4 Environmental Protection

Controllers shall be housed in robust plastic casing and the electronics shall be fully encapsulated to give protection as classified below:

Autowat controller : Protection Classification IP68

Ecowat controller : Protection Classification IP66

Temperature ranges of -10^0 C to $+50^0$ C shall be acceptable for the operation of controllers.

PLZ-3.9.5 Installation Kit:

The following fittings and pipes shall be provided with each controller:

all necessary coloured 6 mm nylon connection tubes (minimum 5 m per tube per installation for installation)
lockable steel container fixed to the chamber wall and supplied with with 70 mm diameter Viro circular padlock.
in-line filter (50 microns) with “push fit” couplings for the 6 mm nylon tube fitted before the controller inlet port.
mini PRV located directly upstream of controller
accumulator
solenoid valve (spare)

PLZ 3.9.6 Commissioning:

The Contractor shall furnish the Engineer with test certificates for each controller. Commissioning of the controller shall be carried out by the Engineer following installation of the controller.

PLZ-3.10 Flow Limiter Valves

PLZ-3.10.1 Screwed type limiter valves

The limiter valve shall consist of a screwed fitting with a rubber control ring orifice insert, which effects a consistent flow control within ± 10% of the rated flow for a differential pressure across the valve over a range extending from 100 kPa to 1100 kPa.

The body of the limiter valve shall be made of uPVC plastic and shall be female screwed at both ends to B.S.P.

The control rings shall be made of flexible nitrite elastomer rubber and must be able to move on a tapered seat in the body as the flow increases and be replaceable. The valve must be complete with control rings for the specified initial flow, which may be replaced in the future (post-contract) for the final flow settings. The flow settings for the flow limiter valves are given in Table PS-3.1 in Part A of the Project Specification.

The screwed type limiter valve must be stamped with the flow in litres per minute and with an arrow to indicate the direction of flow.

The limiter valve shall be a Maric or similar approved.

A flow test must be conducted at the suppliers factory or test facilities, of one sample each of a 20 mm, 25 mm and 32 mm flow limiter valve as prepared for use in the contract, over the following differential pressure ranges:

Differential Pressure (kPa)	Tolerance limit on rated flow
50	± 50%
100	± 10%
150	± 10%
200	± 10%
300	± 10%
1000	± 10%

The measurement of flow rates must be to the satisfaction of the Engineer. If any one of the samples should fail to provide a flow rate within the tolerances specified, then all valves for installation on the contract must be tested for a selection of pressures up to the static pressures to be expected at installation sites, all to the satisfaction of the Engineer.

PLZ-3.10.2 Wafer type limiter valves

The limiter valve shall consist of a wafer pattern with a rubber control ring orifice insert, which effects a consistent flow control within ± 10% of the rated flow for a differential pressure across the valve over a range extending from 100 kPa to 1100 kPa. The valve must site between two flanges.

The body of the limiter valve shall be made of uPVC plastic.

The control rings shall be made of flexible nitrite elastomer rubber and shall be able to move on a tapered seat in the body as the flow increases and be replaceable. The valve shall be complete with control rings for the specified initial flow, which may be replaced in the future (post-contract) for the final flow settings. The flow settings for the flow limiter valves are given in Table PS-3.1 in Part A of the Project Specifications.

The limiter valve must be stamped with the flow in litres per minute and with an arrow to indicate the direction of flow. The wafer type limiter valve shall be a Maric or similar approved.

A flow test must be conducted at the suppliers factory or test facilities, on one sample each of a 50 mm and 80 mm flow limiter valve as prepared for use in the contract, over the following differential pressure ranges:

Differential Pressure (kPa)	Tolerance limit on rated flow
50	± 50%
100	± 10%
150	± 10%
200	± 10%
300	± 10%
1000	± 10%

The measurement of flow rates must be to the satisfaction of the Engineer. If any one of the samples should fail to provide a flow rate within the tolerances specified, then all valves for installation on the contract must be tested for a selection of pressures up to the static pressures to be expected at installation sites, all to the satisfaction of the Engineer.

PLZ-3.11 Electromagnetic Induction Meters

This specification covers the supply, delivery, calibration and commissioning of electromagnetic flow meters are detailed below.

PLZ-3.11.1 General Information

Size of pipe (nominal diameter):	Refer to SoQ
Size of electromagnetic flow meter:	Refer to SoQ
Pressure rating:	16 bar
Primary Head Protection class:	IP68 to Din 40050
Signal Converter Protection class:	IP67
Measured medium:	Wastewater sludge at ambient temperature
Power supply:	115/230 V A.C. +10% to -15 % 50-60 Hz, 10-20 VA
Velocity Range:	0,2 - 10 m/s
Flange insulating kits (per installation):	Two cathodic kits with each flow meter (to suit pressure ratings)
Flow tube liner material:	Hard rubber/neoprene (Primary head), suitable to handle grit

PLZ-3.11.2 Technical Specifications

i) The flow meters shall be fitted with a REMOTE or INTEGRAL mounted signal converter as specified.

ii) The flow meters shall be suitable for installation on pipelines with cathodic protection systems.
iii) The flow meters coil excitation shall be of the pulsed DC field type, and have total zero stability.
iv) The flow meters shall be suitable for metering the flow of wastewater, sludge which will be corrosive in nature. The conductivity needs to be determined on site.
v) The flow meters shall have an overall system accuracy of 0,25% over a velocity range of 0,2 m/sec to 10 m/sec.
vi) The overall accuracy of the flow meters shall be deemed to include the measuring discrepancies due to linearity, hysteresis, analogue/pulse outputs, material/ ambient temperature fluctuations, and power supply variations.
vii) The overall accuracy of the flow meters shall have a long-term repeatability of less than 0,1% of flow rate.
viii) The flow meters shall be supplied complete with cathodic protection kits, including, insulated gaskets, stainless steel bolts and nuts, insulated sleeves, stainless steel washers and stainless-steel earthing rings.
ix) The flow measurement shall be bi-directional, i.e. flow in two directions.
x) The flow meters shall be suitable for the monitoring of the specified medium and/or process control and will come complete with ports to be connected to an PLC.
xi) Tenderer's are required to complete the technical data sheet attached to Section 5, which indicates conformance to specifications contained herein.
xii) Should the Tenderer wish to submit an alternative offer to the above specification, this offer must give details to variances from this specification at tender stage.

PLZ-3.11.3 Primary Head

The flow meters shall be suitable for mounting between flange plates conforming to SABS 1123 Table 1600/3 and shall be able to withstand a maximum pressure of 16 Bar.

(ii) The electrodes shall be stainless steel 1,4571 (AISI 316 Ti), and shall be flush-mounted, solidly fitted and self-cleaning.

PLZ-3.11.4 Signal Converter

i) The signal converter shall be microprocessor-based, with all functions and data programmable.
ii) The signal converter shall be provided with isolated four 20 mA analogue and 24 VDC pulsed outputs, with the time between scaled pulses at maximum flow rate, and the pulse width shall be user configurable.
iii) The flow meter shall be dual range.
iv) Where a dual range (high and low) facility is required, each range shall have separate isolated four 20 mA analogue outputs.
v) The low flow cut-off from 0 - 10% of full-scale range at 100% flow rate shall be separately programmable for analogue and pulse outputs. pipe detection (EPD) shall be incorporated.
vi) The signal converter shall have a local, backlit, liquid crystal display indication of the flow rate and totalised flow, which shall be programmable in measuring units to suit. The display will be flame proof and able to measure in l/s to 2 decimals.
vii) Storage of all data shall be retained in non-volatile memory.

PLZ-3.11.5 Supporting Documentation

(i) The Contractor shall be required to supply full workshop documentation on the flow meters prior to installation. These documents shall include all diagrams, component schedules, and diagnostic procedures.

The Contractor shall be required to supply test certificate/s certifying an accuracy of 0,25% or better, of the actual flow from 0% to 100% of the full-scale reading, prior to installation.

PLZ-3.11.6 Test Simulator

(i) It is a requirement of this contract that the flow meters are to be supplied with a primary head simulator, which is capable of simulating the complete range of velocities from 0 - 10 m/s.

A separate item has been included in the Schedule of Quantities for the test simulator.

PLZ-3.11.7 Lightning Protection

Lightning protection for the flow meter installations as well as connections to the telemetry system (where applicable) will be required in accordance with the specification for Electricity Supply to Meters.

PLZ-3.11.8 Commissioning, Manuals and Training

The Contractor shall arrange for the manufacturer of the approved flow meters installed under this contract, to make available an authorised representative to be present on site during the commissioning of the flow meters.

Three copies of an installation and operations manual shall also be supplied.

The Contractor shall also make arrangements for the hands-on training of operations field staff in the principles of operations of the meters, setting up and operation of the meters, troubleshooting and testing, and maintenance. No additional payment will be done for this as it shall be included in the rate for the meter.

PLZ-4 CONSTRUCTION

PLZ-4.1 Exposing and inspection of existing valves, and meters by the Engineer

The Contractor shall open up, expose, and where necessary de-water chambers for each valve or meter requiring attention, by adequate excavations around the valve or meter and cleaning the chamber and valve,or meter to enable the Engineer to carry out an in-situ inspection of the valve. The Contractor shall accompany the Engineer during the inspection. The Engineer, in conjunction with the Contractor and Employer's staff, shall decide whether the valve, or meter can be repaired in situ or whether the valve,or meter has to be taken out.

PLZ-4.2Removal or Replacement **of Valves, and meters**

PLZ-4.2.1 Valves, and meters to be repaired in situ

If in-situ repairs can be done to a valve, or meter, the Engineer may instruct Contractor to carry out such repairs with the least delay.

The Contractor will be expected to carry out any further excavations which may be necessary to allow working space, and he will also be responsible to keep the excavations dry. After completion of the repairs he shall, if necessary, construct a chamber as specified, backfill and compact around the chamber and reinstate the surface. Open excavations shall be properly barricaded and covered up at all times.

PLZ-4.2.2 Valves, and meters to be removed for repair or replacement

All renovations or repairs to valves shall be done according to the requirements of ISO 9002 and SABS 0257. If during inspection, it is decided by the Engineer to remove and replace a valve,or meter, the Contractor shall do the following:

The Contractor shall supply all equipment needed for off-loading, handling, removal and installing.

Valves, or meters and specials shall be installed by experienced and competent pipe fitters and welders. It shall be placed accurately to line and level and neatly finished off in a workmanlike manner. Spanners used to loosen and tighten bolts shall only be set spanners of the correct sizes. In no circumstances will the use of shifting spanners be permitted.

Drift pins, jacking equipment and the like shall not be used to bring improperly fabricated members into place. A moderate degree of cutting and reaming may be employed to correct minor misfits only if, in the opinion of the Engineer, this will not be detrimental to the appearance or strength of the equipment. Burning of holes will not be permitted without the written approval of the Engineer.

All made up steel sections and items to be installed in lines shall have an approved internal epoxy coating applied. Where welding has been done on existing steel pipes, epoxy repair coatings shall be done using Copon JHC 21 High Coat (or similar approved) of minimum thickness 250 microns in accordance with the manufacturer's specification, before recommissioning of the line/s, and taking adequate curing time into account.

All material shall, before installation, be checked to ensure that it is in good order and condition and each item must be thoroughly cleaned inside and outside.

Any equipment showing cracks, blowholes, broken flanges or other defects shall be set aside and the Engineer called upon to determine whether it has to be repaired or replaced, all at the Contractor's expense.

On completion the site shall be cleaned of all surplus materials and debris and left in a clean and tidy condition.

Any excavations left open during the replacement procedures shall be properly barricaded and temporarily covered up to prevent any person or animal from falling into open excavations. No excavation shall be allowed to proceed unless barricading and other safeguarding materials are on site. The Contractor must ensure that the amount tendered shall make adequate provision for the cost of barricading and safeguarding of open excavations.

Areas to be repaired by welding shall first be ground and/or machined to sound metal.

Inspect the wedge gate seating for standard of fit, by using marking chalk. Seats and guides in good condition shall be cleaned and re-finished by hand sanding only.

Check the spindle for straightness and cracks using dye penetrant testing. Spindles showing cracks or marks of overstressing or otherwise deemed unsuitable and not complying with the valve manufacturer's standards shall be replaced, if replacement parts are readily obtainable.
On re-assembly, the following items shall be replaced with new materials complying with the specification of the original manufacturer:

(i) All bolts and nuts, which shall be cadmium-plated mild steel.
(ii) Spindle nut and gate nuts.
(iii) Removable spindle thrust collars.
(iv) Gland packing.
(v) Resilient seals.
(vi) Gaskets

Reconditioned valves shall be tested to open and close freely when operated by a single operator.

Valves shall be repainted externally and internally, taking care not to impair the valve functioning.

Valves shall be cleaned to SABS 064 Sa2 standard by hand or sandblasting.

Valves shall be painted internally with three coats of Copon EP2300 and externally with one coat of calcium plumbate primer and one coat of grey high build, chlorinated rubber paint. Flange faces shall receive one coat of easily removable rust preventative.

Body ends of reconditioned valves shall be sealed with covers to prevent ingress of foreign matter.

Reconditioned valves shall be permanently marked by means of hand stamping onto a flange edge, a number specified by the Engineer.

(c) Meters

Inspect the wall of the body and bonnet for any reduction of thickness. Obvious reduction of the wall thickness (in excess of 10%) shall be cause for rejection of the meter body or bonnet.

Areas to be repaired by welding shall first be ground and/or machined to sound metal.
Inspect the meter mechanism to see if it is still in a good working condition. If not, the meter must either be replaced or the mechanism must be exchanged.

Reconditioned meters shall be tested for measuring accuracy if permission by the Engineer was given for the replacement of the mechanism.

Meters shall be painted with a high-quality sintered epoxy powder coating, both internally and externally.

PLZ-4.5 Manholes

PLZ-4.5.1 General

Manholes shall be constructed in accordance with the details shown on the drawings.

Manholes shall house both valve and meter and integral bypass where applicable.

In some cases, it will not be necessary to demolish existing valve, or meter chambers and manholes, and the construction of new manholes will not be required. In such cases it may however be necessary to replace the existing cover slabs with reinforced concrete cover.

Provision will be made in the schedule of quantities for separate payment for such slabs and the cleaning out valve, or meter chambers.

PLZ-4.5.2 Covers and frames.

Manhole covers and frames shall be of cast iron or of precast concrete (Salberg or similar approved) of medium or heavy-duty type as the situation requires. Covers shall have steel lip rings to protect the edges.

PLZ-5 TESTING

PLZ-5.1 Standard Hydraulic pipe test

PLZ-5.1.1 Test Pressures and Time of Test

Test pressures on all pipes shall be 1,25 times the working pressure up to a maximum of the pipe class pressure.

New valves, PRV's and motors shall be tested if so ordered by the Engineer.
Reconditioned valves, PRV's and meters shall be tested as described in PLZ-4.3.3.

PLZ-6 MEASUREMENT AND PAYMENT **(SCHEDULED ITEMS)**

PLZ-6.1 General

All valves, PRV's, flow limiters, meters and chambers shall be as specified in this Particular Specification PLZ, as detailed on the drawings and as described in the schedule of quantities.

PLZ-6.2 Scheduled items

PLZ-6.2.1 Manholes, chambers for valves, PRV's, flow limiters and meters complete as detailed on the drawings (drawing numbers to be stated) (specify)

(a)	1500 mm diameter precast chamber 2,0 m high, complete	Unit : No
(b)	1800 mm diameter precast chamber 2,0 m high, complete	Unit : No
(c)	Reinforced concrete chambers for 100 mm dia meters	Unit : No
(d)	Reinforced concrete chambers for 150 mm dia meters	Unit : No

The tendered rates for chambers shall cover the cost for the supply and installation of chambers constructed from pre-cast concrete rings (where specified) reinforced, concrete walls, floor slabs, roof slabs, inclusive of all formwork and finishing with covers, vents and brick or concrete supports complete, as detailed on the drawings.

PLZ-6.2.2 Supply and installation of valves, meters, pipework and specials in chambers (measured under PLZ-6.2.1) (the installation in different size chambers will be measured separately).

PLZ-6.2.2.1 In 1500 mm diameter chambers (PLZ-6.2.1(a)):

.... mm dia pipework, specials valves and meters
(list according to items as detailed on the relevant drawings) ..... Unit : No

... mm ..... (etc. for other diameters of pipework, specials,
valves and meters) …….…….. Unit : No

(c)etc. (for other diameters) ……..…….. Unit : No

PLZ-6.2.2.2 In 1800 mm diameter chambers (PLZ-6.2.1(b))

..... mm dia pipework, specials valves and meters
(list according to items as detailed on the drawings) ..... Unit : No

(b) ..... mm ..... (etc. for other diameters) …….. Unit : No

PLZ-6.2.2.3 In reinforced concrete chambers (PLZ-6.2 (c) and (d))

Complete 100 mm dia pipework, fittings, valves,
strainers and meters all as detailed on the drawings……. Unit : No

Complete 150 mm dia pipework, fittings, valves,
strainers and meters all as detailed on the drawings……. Unit : No

Cutting of existing pipe (state diameter) each side
of a chamber, per chamber ……. Unit : No

The tendered rates, pipework and specials shall cover the cost for the supply, installation, testing and disinfecting of the pipes and specials, including cutting into existing pipes and through precast concrete rings as necessary to complete the installation.

The tendered rates for valves shall cover the cost of supply and installation and bedding of the valves, testing of the valve assemblies, cutting of pipes and manhole rings as necessary, couplings and short pipe lengths as required.

PACKAGE PLANT SPECIFICATION

PARTICULAR SPECIFICATION PP: PACKAGE PLANT SPECIFICATION

CONTENTS

PP: PACKAGE PLANT SPECIFICATIONS

PP-1: SCOPE

This specification covers the design, construction, supply, delivery, installation, commissioning of civil and structural works, valves and other ancillary equipment for the treatment of wastewater using a **Containerised Trickle Filter Package Plant.**

Wastewater works shall mean all units, components, equipment and materials, and their relation to each other, employed to enable reliable and effective wastewater treatment.

Package plants may be defined as any on-site sewage wastewater treatment system.

This specification covers the operation of a wastewater works and equipment related to effective wastewater treatment. These are minimum requirements, and the designer shall assess the parameters and specifications, as well as the conditions on the WwTW site, and if need may be, shall use stricter criteria than those specified.

A containerised plant will be used. The plant is designed to produce effluent in terms of the current South African Water Act with specific reference to the Irrigation Limits, defined in the South African law. The product water from the plants will be able to be used as irrigation.

The containerised solution will have a capacity of 150 m3/day wastewater. No screen has been included as the feed water to the plant comes through a septic tank.

Basics of Design

The trickle filter plant has been designed according to the following parameters:

- Design flowrate: 150 m_3/day
- Type of Effluent: Typical domestic sewage (Specified)
- Influent Chemical Oxygen Demand (COD): 650 mg/l (Assumed)
- Influent Total Kjedahl Nitrogen: 65 mg/L (Assumed)
- Influent Total Phosphates: < 10 mg/L as P
- Influent fat, oil and grease: < 10 mg/L
- Discharge Limit: Department of Water and Sanitation (DWS; general standards)
- Supply voltage on site: 380 VAC

The above parameters will need to be confirmed on appointment and requires a batch sample to be sent to s laboratory for analysis.

This specification covers requirements for effluent standards, as well as testing procedures and equipment to verify these standards.

Main envisaged process units

The main envisaged process units are as follows:

- Lift station.
- One set of trickle feed pumps (duty /standby) installed in the client's septic tank.
- One splitter box.
- Two trickle filters stacked on top of the client's concrete tank.
- One lamella clarifier.

- One contact tank.
- One set of treated water pumps (duty/standby).
- One hypo dosing station for final disinfection.
- One moveable desludge pump.

All above ground, interconnecting pipework will be uPVC. The Motor Control Centre (MCC), Programmable Logic Controller (PLC) and Human Machine Interface (HMI) will be installed inside a 6m, refurbished shipping container.

Process Description

Raw domestic sewage is fed by gravity the client to a concrete lifting sump from where it it's transferred by a set of duty/standby lifting pumps into a concrete septic tank. A set of duty/standby submersible pumps installed inside the last chamber of the septic tank transfer wastewater across the trickle filter for treatment. The start-stop signals of the trickle feed pumps are controlled by float level switches installed in the septic tank.

The trickle filter is arranged as a tower of high specific surface area plastic packing media. Wastewater is introduced evenly across the surface of the packing media via evenly spaced distribution nozzles. Wastewater flows down through the media and a biofilm is propagated on the surface of the media. The biofilm is the living component of the system and utilises incoming COD and nutrients as a food source thereby removing them from the wastewater stream. Aged biofilm will naturally shear off from the plastic media resulting in solids deposition into the treated waste stream.

Water is collected in a basin below the packing media and flows is directed to splitter box which recycles wastewater into the recycle sump, ensuring constant wetting, and to the clarifier feed chamber. The trickle filter effluent enters the clarifier and flows upwards through the lamella packing. Particles settle out as a sludge at the bottom of the clarifier. The clarifier is de-sludge periodically and discharge to the first chamber of the septic tank by the duty treated water and sludge pump. The sludge pumps act as the product transfer pumps and therefore flushed with treated water after a desludge event before being used to pump treated effluent tot the client discharge location.

Effluent exits the clarifier over V-notch weirs, that act as a scum baffle, into a launder and flows under gravity to a chlorine contact tank. Chlorine is dosed by a dedicated chlorine dosing pump to ensure disinfection of the effluent before discharge. The contact tank is sized to ensure a minimum of 30 minutes contact time between effluent and chlorine to achieve total disinfection of the effluent.

The treated water is pumped by the combination sludge and treated water pumps to the point of discharge, at the discretion of the client.

Desludging is carried out manually by opening the desludge valve located at the base of the client's septic tanks. Sludge will be directed to the first chamber of the septic tank. **The septic tank is desludge by the client once every 1-5 years depending on the operation of the plant.**

Estimated power consumption.

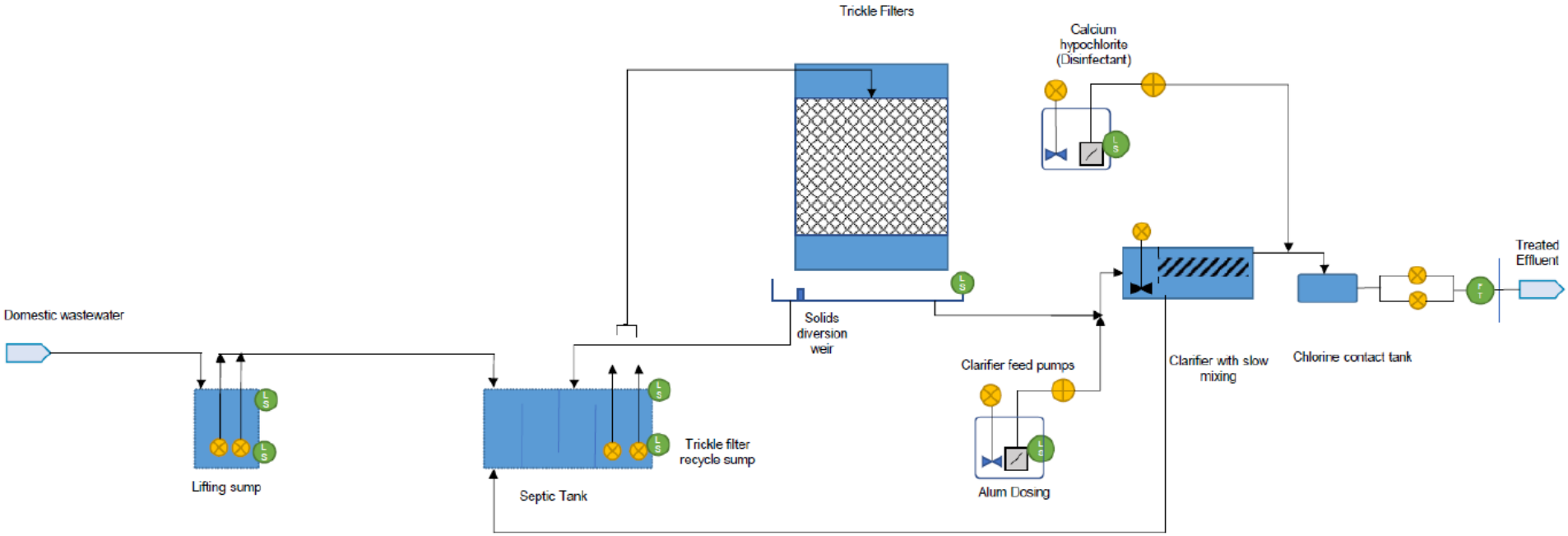
Table 1: Estimated Power Consumption

Description	Configuration	Installed Power [kW]	Absorbed Power [kW]
Lift pumps	Duty/standby	8	4
Trickle filter feed pumps	Duty/standby	8	4
Treated water and desludge pumps	Duty/standby	2.2	1.1
Calcium hypochlorite dosing pump	Duty	0.019	0.019
Calcium hypochlorite dosing tank mixer	Duty	0.55	0.55
Moveable desludge pump	Duty	1.2	1.2

Scope of Works

- Design 150m³ Trickle filter system (process, mechanical and electrical).
- Procurement, engineering, and manufacture (150m³ Trickle filter system).
- Yard assembly, painting, and corrosion protection (150m³ Trickle filter system).
- Factory acceptance testing of 150m³ Trickle filter system.
- Packing for transport of 150m³ Trickle filter system.
- Operation and maintenance manuals for 150m³ Trickle filter system.
- Civil guideline drawings for 150m³ Trickle filter system.
- Transportation, delivery of 150m³ Trickle filter system to site.
- Offloading of 150m³ Trickle filter system using 30 Ton crane.
- Supply and install distribution board and electrical connection for 150m³ Trickle filter system, including, excavation, cabling, bedding, electrical danger tape, backfilling and compaction.
- Supply, install and commission instrumentation for 150m³ Trickle filter system.
- Install and Commission 150m³ Trickle filter system including all chemicals to run the system.

Process Diagram



PACKAGE TREATMENT PROCESS FLOW

Battery limits

The following battery limits have been defined below to illustrate the take-over points as per our offer:

Process

- Flanged connection point 1 m from upstream of the lifting sump.
- Flanged connection point 1 m downstream of the common discharge of the treated water pumps.
- Flanged connection point on top of the concrete tank to desludge.

Preliminary Project Programme

The following is a preliminary breakdown of the **initial** plant delivery:

- Design and drawings: 8 weeks.
- Procurement and manufacture: 16 weeks
- FAT and Packing for delivery: 1 weeks
- **Total Programme (Package Plant excl installation and commissioning): 25 weeks**

GENERAL SPECIFICATION

PP-2: INTERPRETATIONS

PP-2.1: Supporting specifications and drawings

The following supporting specifications will form part of this specification:

(a) Standard Specifications
All relevant Standard Specifications for Civil Engineering Construction, SABS 1200 and the amendments as part of the Project Specifications.

(b) Particular Specifications

PBA BUILDING WORK (SMALL WORKS)

PDB SURFACE EXCAVATION

PDD PROTECTIVE COATING SYSTEM FOR MECHANICAL EQUIPMENT AND PIPE INSTALLATION IN WATER AND WASTEWATER TREATMENT PLANTS

PMD MOTORS

PME MOTOR STARTERS

PMG GROUTING OF MACHINE & STRUCTURAL BEDPLATES

PLZ VALVES, PRV'S, FLOW LIMITERS AND METERS

PCB FENCING

PGW GEOTECHNICAL INVESTIGATIONS

PSM PREVENTATIVE AND SCHEDULED MAINTENANCE SYSTEM

(c) Other:

SABS 0142 - 1987: Code of practice for the wiring of premises.

(d) Drawings:

All standard, general and project (if applicable) drawings included in the tender documents.

PP-2.2: Application

This specification contains clauses that are generally applicable to the design, supply, delivery, installation, commissioning and maintenance of sewage package plants, chemical solution make-up tanks, chemical dosing equipment, associated pumps, pipework, valves and other ancillary equipment for the treatment of wastewater.

PP-2.3: Definitions

For the purposes of this specification the definitions and abbreviations given in those specifications listed in 2.1 which are applicable.

PP-2.4: Designer

The design of the Wastewater treatment works, including all the surveying, geotechnical investigations and interpretations, hydraulic and process design, civil works, structural design, specialist equipment design, mechanical and electrical works shall be done by a competent, professional, engineer registered at the Engineering Council of South Africa (or international recognized equivalent), with proven experience in the design of water treatment works. A curriculum vitae demonstrating capability in the design of water treatment and water retaining structures together with the registration number of the design engineer shall be submitted.

The contractor will take full responsibility for the entire design of the water treatment works, including the functioning and durability to achieve the specified water quality standards and flows.

PP-2.5: Drawings

The contractor shall supply fully dimensioned drawings and design calculations for the required works not later than eight weeks after the award of the contract.

Accepted drawings shall form an integral part of the contract documents and any drawing not accepted and signed shall not be permitted on site of the works for construction purposes and/or used in the manufacture of any items. Notwithstanding the approval and/or acceptance and signing of the drawings the contractor shall take full responsibility for all details, discrepancies, omissions, errors and functioning (performance) of the works in respect of the said drawings as well as the consequences thereof.

The Engineer shall require three weeks to review the drawings. The approval in principle of the drawings shall not relieve the contractor of any responsibility in terms of the contract.

PP-3: MATERIALS AND EQUIPMENT METHODOLOGY

PP-3.1: Selection against corrosion

In a Wastewater treatment plant the very corrosive nature of the environment and the substances in contact with the materials and equipment require that special attention shall be given to the selection of materials and equipment capable of withstanding corrosion due to these circumstances.

Any material or equipment showing signs of corrosion during the Guarantee Period shall be rejected and be replaced by the Contractor at his own expense with materials or equipment resistant to corrosion as shown by a re-test.

PP-3.2: Guarantee

All equipment shall be guaranteed against faulty design, materials and workmanship for a period of **two (2) years** from the date of commissioning. During this period the contractor shall rectify, at his own cost, any defects which can be attributed to faulty design, materials and workmanship. Normal wear and tear shall be excluded.

PP-3.3: Information and technical data at tendering

Full information and technical data on all materials and equipment offered, shall be supplied at tendering. Manufacture's pamphlets and catalogues shall be edited and clearly marked so as to describe the particular equipment offered.

PP-4: PLANT REQUIRED AND DELIVERIES

PP-4.1: Introduction

The Contractor is to design, construct and commission all aspects of the containerised sewer package treatment plant to ensure that it complies with the water quality specifications, design criteria and requirements for operation and maintenance.

The containerised sewer package treatment plant will be categorised as with the provision that the average daily effluent discharge is 120 cubic meters per day. Various structures, buildings, access roads and supporting infrastructure will be improved or constructed to ensure the efficient operation of the works.

The Contractor shall be responsible for off-loading and protection of all the material and equipment at the site as well as the stacking of such material in a depot indicated by the Engineer.

No deliveries will take place on Saturdays, Sundays or statutory non-working day unless special arrangements have been made with and agreed to by the Engineer.

The Contractor shall be solely responsible for the obtaining of transport and importation permits and clearance from road or rail authorities for the transporting and delivery of materials and equipment as well as the compliance with the requirements of such bodies.

PP-4.2: Design Parameters
Assessment of the following design parameters is a prerequisite for proper operation of the wastewater works:

Table 1: Key Design Parameters For Activated Sludge System

Population served & per capita organic loads
Average & peak dry & wet weather flow rates
Hydraulic, organic & nutrient loading rates
Sludge age (20 – 30 days) & solids loading rate
Active sludge mass & density
Hydraulic control of sludge mass (by wasting of sludge from reactor): WAS rate – volume of reactor/sludge age
Sludge age required for nitrification
Return flow rate of activated sludge (1.5 – 2.5 x influent flow rate)
Oxygen requirements, type & capacity if aeration equipment, control of aeration rate
Surface and solids flux loading rates of clarifier (sludge volume index)
Additional reactor volume & anaerobic/anoxic zones required for biological nutrient removal

NOTE: Acknowledged guidelines must be used for design & construction, e.g. WISA, 1988: Manual on the Design of Small Sewage Works

PP-4.2.1:General Standard Specifications, Regulations and Codes
The latest edition, including all amendments up to date of tender, of the following specifications, publications and codes of practice shall be read in conjunction with this specification and shall be deemed to form part thereof.

SANS 1200	Standardized specification for civil engineering construction	
SANS ISO 5667-2	Water quality sampling, part 2	Guidance on sampling techniques
SANS ISO 5667-2	Water quality sampling, part 10	Guidance on sampling of wastewater (when available)
SANS SM 11	Water	PH value
SANS SM 217	Water	Free and saline ammonia content
SANS SM 1048	Water	Chemical oxygen demand
SANS SM 1049	Water	Suspended solids content
SANS SM 1057	Electrical conductivity of water	

SANS ISO 4831	Microbiology	General guidance for the enumeration of coliforms: Most probable number technique
SANS ISO 4833	Microbiology	General guidance for the enumeration of coliforms: Colony count technique at 30°C

PP-4.2.2: Acts, Regulations and Statutory Requirements
All relevant regulations and statutory requirements as laid down in the latest edition of the following acts shall be adhered to:

- Occupational Health and Safety Act, 1993 (No. 85 of 1993)
- National Water Act (No. 36 of 1998)
- Water Services Act (No. 108 of 1997)
- Environment Conservation Act (No. 73 of 1989)
- National Environmental Management Act (No. 107 of 1998)

PP-4.4.3: Manufacturers' Specifications, Codes of Practice and Installation Instructions
All equipment and materials shall be installed, serviced and repaired strictly in accordance with the manufacturers' specifications, instructions and codes of practice.

PP-4.4.4: Municipal Regulations, Laws and By-Laws
All municipal regulations, laws, by-laws and special requirements of the Local Authority shall be adhered to unless otherwise specified.

PP-4.4.5: Definition of Water Use
This specification covers the legal requirements for water use as regulated by the National Water Act (No. 36 of 1998). A large fraction of the activities performed by the Department of Public Works is covered by the general authorization in terms of Section 39 of the Water Act. The following categories of water use are scheduled:

- Taking of water and storage of water (Section 2 (a) and (b)) of the Water Act.
- Engaging in a controlled activity, identified as such in Section 37 (1) of the Water Act. Irrigation of any land with waste or water containing waste generated through any industrial activity or by water works (Section 21 (e) of the Water Act).
- Discharging of waste or water containing waste into a water resource through a pipe, canal, sewer or other conduit, and disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generating process.
- Disposing of waste in a manner which may detrimentally impact a water resource (Section 28 of the Water Act).

PP-4.4.6: Registration of Water Use
According to the Water Act a water use must be registered with the Department of Water Affairs and Forestry (DWAF). The prescribed forms are available DWAF's internet web site.
http://www.dwaf.gov.za
The application forms for registration or licensing of a water use are available on the above website. Forms DW 771 / DW 758 R1c.doc (updated version) – Licensing Part 1: Company, Business or Partnership, National or Provincial Government is applicable.
Parts 1, 3, 4 and 8 of these forms will be completed by the Department of Public Works. All other forms shall be completed and submitted by the Contractor.
These registration forms shall be completed by the Contractor and must be submitted to:
The Director-General
Department of Public Works
Private Bag X65
PRETORIA
2001
For attention of: **Deputy Director, Water Management**

Based on the information so provided, the Department of Water Affairs and Forestry may require the applicant to apply for a license for the relevant water or wastewater works.

PP-4.4.7: Licensing of a Water Use

In general a water use must be licensed unless it is:

- Listed in Schedule 1 (See page 152 of Government Gazette No. 19182 dated 26 August 1998)
- An existing lawful use.
- Permissible under a general authorization (See Government Gazette No. 20526 dated 8 October 1999)
- The responsible authority can waive the need for a license.
- If licensing is required, the Department of Public Works will appoint an independent consultant for the duty.

PP-4.4.8: Operator Registration and Classification of Water Care Works

In the terms of Section 26 (f) of the Water Act (No. 36 of 1988) operators shall be registered with the Department of Water Affairs and Forestry. The Contractor shall be responsible for the registration of workers/operators in terms of this requirement (See Regulation R2834 dated 27 December 1985). The water care works will be classified by the Engineer for tendering purposes.

PP-4.4.9: Environmental Impact Assessment (EIA)

In terms of Government Notices R1182 and R1183 of 5 September 1997, new water care works as well as upgrading of water care works are generally subject to Environmental Impact Assessment. The relevant procedures are described in a guideline document: EIA Regulations, Implementation of Sections 21, 22 and 26 of the Environment Conservation Act (No. 73 of 1989).

General Limit

Substance /Parameter	General Limit
Faecal Coliforms (per 100mℓ)	**1000**
Chemical Oxygen demand (mg.ℓ$^{-1}$)	**75***
PH	**5.5 - 9.5**
Ammonia (ionised and un-ionised) as Nitrogen (mgℓ$^{-1}$)	**6**
Nitrate/Nitrite as Nitrogen (mgℓ$^{-1}$)	**15**
Chlorine as Free Chlorine (mgℓ$^{-1}$)	**0.25**
Suspended Solids (mgℓ$^{-1}$)	**25**
Electrical Conductivity (mSm^{-1})	**Intake +70 Max 150**
Ortho Phosphate as phosphorous (mgℓ$^{-1}$)	**10**
Floride (mgℓ$^{-1}$)	**1**
Soap, oil or grease (mgℓ$^{-1}$)	**2.5**
Dissolved Arsenic (mgℓ$^{-1}$)	**0.02**
Dissolved Cadmuim (mgℓ$^{-1}$)	**0.005**
Dissolved Chromium (mgℓ$^{-1}$)	**0.05**
Dissolved Copper (mgℓ$^{-1}$)	**0.01**
Dissolved Cyanide (mgℓ$^{-1}$)	**0.02**

Dissolved Iron (mg/ℓ$^{-1}$)	**0.03**
Dissolved Lead (mg/ℓ$^{-1}$)	**0.01**
Dissolved Manganese (mg/ℓ$^{-1}$)	**0.1**
Mercury and its compounds (mg/ℓ$^{-1}$)	**0.005**
Dissolved Selenuim(mg/ℓ$^{-1}$)	**0.02**
Dissolved Zinc (mg/ℓ$^{-1}$)	**0.1**
Boron (mg/ℓ$^{-1}$)	**1**

*** After Removal of Algae**
An independent consultant will generally be appointed to conduct such assessment. An EIA must be submitted to the Department of Environmental Affairs and Tourism for approval by means of a Record of Decision.
Under normal conditions, an EIA will not be required for repair of water care works.

PP-4.4.10: Environmental Management Plan (EMP)
An Environmental Management Plan (EMP) is required for all repair work that may generate waste (such as sewage sludge) or that may detrimentally impact the environment during repair and operation of the water care works.
The Contractor shall prepare and submit an EMP to the Engineer for approval. The EMP should guide repair work so as to safeguard the environment from detrimental impact. The Contractor shall make provision in his tendered rates for all costs implied by the EMP.

PP-4.4.11: Water Quality Standards
The General Limit for wastewater effluent is detailed below:

PP-4.4.12: Selection of Appropriate Treatment Process
The selection of an appropriate treatment process is essentially determined by:

- The raw influent quality (physical and chemical).
- The prescribed final quality.
- Appropriate technology relevant to the institutional and financial capacity of the owner.

PP4.4.13: Loading Rates and Design Parameters
- The mobile wastewater treatment package plant will be designed to cater for an average daily effluent discharge of 120 cubic meters per day.

PP4.4.14: Accessibility
All valves contained within the works will be mounted above ground. Where this is not possible the valve chambers will be constructed from water tight pre-cast concrete with a RI concrete floor, 300 mm below the bottom of the valve and a RI cover slab with a RI concrete manhole cover, complete with GMS ring and lifting hooks.

All units should be easily accessible, and easily removed for repairs. Walkways should be provided to give safe access to all points requiring inspection and to provide logical progression to operators doing inspections. Ease of handling chemicals should receive special attention.

All elevated or recessed areas, wet or dry, that could be a hazard for people falling and/or drowning will be barricaded with GMS (hot dip, 150 microns) hand rails. An internal and external access ladder shall be provided with tall tanks and water retaining structures. These shall be located at positions agreed with the client. The external access ladder shall be protected by a safety cage from 2,5 m above ground level, with landings protected with handrails at intervals of 9 m maximum. The internal access ladder of stainless steel 304 shall be located at the access hatch in the roof cover. The design and construction of the ladders and hand rails shall comply with the requirements of **SANS 10104** and the **Occupational Health and Safety Act (No 85 of 1993)**.

PP-12.0: PIPEWORK

The requirements for this pipework are as follows:

(i) Pipework shall where specified shall be of mild steel. The steel pipes, specials and fittings shall be manufactured in accordance with Specification SABS 62, Medium Duty for pipes up to 150 mm ND and according to SABS 719, grade 300 WA steel with a minimum wall thickness according to Table 2, column 3 of SABS 719.

(ii) Mild steel pipework of 150 mm ND and larger shall be epoxy lined and coated, with a minimum dry film thickness of 350 microns in accordance with SABS 1217 (1984). Smaller pipework shall be hot dip galvanised according to SABS ISO 1461 with a minimum FFT of 150 microns. Sand blasting will be necessary to obtain this thickness.

(iii) All buried mild steel pipework shall be wrapped with a PVC-bitumen tape, Denso Clad 70 or equal approved (55% overlap) and flanges or flexible VJ couplings shall be wrapped with petroleum mastic and PE sheets.

(iv) Stainless steel pipework shall be manufactured according to ASTM A312, schedule 10 and of Grade 316L.

(v) Pipe diameters not specified shall be determined by the Tenderer to suit equipment offered and to conform to required flow rates.

(vi) Pipes shall be adequately supported by hot dip galvanised/SS304 brackets or other suitable method. Additional support shall be provided if required by the Engineer at the contractor's expense.

(vii) Where pipes pass through reinforced concrete walls they will be stainless steel and suitable puddle flanges shall be provided.

(viii) After installation, all pipework and valves shall be painted with two layers of an enamel paint to comply to a colour coding system as determined by the Engineer. Paint shall be applied only after suitable surface preparation as required by the paint manufacturer. Galvanised pipework shall be treated and primed before painting.

PP-13.0: VALVES

If pneumatically operated valves are offered, the tendered price shall include for the supply and installation of a suitably sized motor driven compressor, complete with air receiver, oil traps, pressure regulating valves, limit switches etc. to stop and start the motor at set pressures, etc. and all pressure connections.

All power operated valves shall be provided with a handwheel or with other controls for manual operation.

All valves supplied shall be in accordance with the Particular Specification PLZ for the Supply of Valves.

Technical Schedules included in this document shall be completed at the time of tendering.

PP-14.0: ELECTRICAL INSTALLATIONS

All electrical installations shall conform to the latest laws, bylaws and requirements of the relevant authorities.

All electrical plant shall be effectively earthed. On completion, each part of an electrical installation shall be tested for insulation resistance and earth continuity.

All control distribution boards, electrical materials, instruments equipment, etc. shall conform to section 3, "Specifications for Electrical Equipment" insofar as it applies.

PP-15.0: TOLERANCES VALUES

Tolerances are to be such that the equipment performs within the requirements of this specification.

PP-16.0: COMMISSIONING AND ACCEPTANCE

The Contractor shall be responsible to commission all equipment and put in readiness for use.

The handover/acceptance of equipment shall be preceded by a forty-eight (48) hour trial run by the Contractor to enable him to prove to the Engineer that all equipment and the plant as a whole performs to requirements.

Thereafter, the equipment shall be run by the Contractor as directed by the Engineer for a further period of approximately five (5) days during which thorough inspection, testing, etc. of all equipment will take place to be evaluated for acceptance by the Engineer. The Contractor shall schedule this period such as to allow himself enough time to remedy, replace, etc. unsatisfactory work, equipment, etc. and still meet the final completion date.

Costs incurred by the Department for all unsuccessful acceptance tests will be borne by the Contractor.

When the Contractor has completed all work and the plant subsequently performs to requirements, then the contractor shall supply all manuals and drawings as called for in clause 17. Thereupon a certificate of commissioning will be issued and a portion of the retention released. The guarantee period then commences.

PP-17.0: FINAL COMPLETION DATE

On final completion all work in terms of the contract shall be completed. A certificate of completion will be issued.

PP-18.0: MAINTENANCE OBLIGATIONS

The Contractor shall maintain all equipment provided in a good working order during the maintenance period.

The maintenance period shall commence on the day following final completion.
The Employer reserves the right to undertake any emergency repair work during the maintenance period without the prior consent of the Contractor. The Engineer has the right to decide whether an emergency exists and shall notify the Contractor accordingly. Should this emergency repair work be caused by poor material, faulty workmanship or neglect on the part of the Contractor, the Employer may deduct the cost of the repair work from the outstanding retention money owing to the Contractor.

After the satisfactory completion of the guarantee period, the completion certificate will be issued and all retention money released.

PP-19.0: WATER TANKS FOR IRRIGATION

Vertical water tanks are to be installed on a tank stand to be designed and approved by the engineer. The water tanks is to comply with the following:

- 10-year warranty
- Made with food grade quality virgin LLDPE
- UV – resistant & BPA free

PP-21.0: OPERATION AND MAINTENANCE MANUALS

Five copies of comprehensive operation and maintenance instructions in the form of hard covered manuals with a rear pocket enclosing prints of relevant as-built drawings shall be supplied.

All manuals shall be supplied prior to handover/acceptance of equipment. The Completion Certificate will not be issued nor will the corresponding payment be made until the above manuals and drawings have been supplied.

Operating instructions shall include:

- index;
- pre-start check list;
- step by step description of the approved procedures for all modes of operation of equipment;

- descriptions of required safety checks.

Maintenance manuals shall include:

- index;
- details of routine and regular maintenance work which the manufacturer considers necessary to maintain equipment in satisfactory running order;
- instructions for the repair or replacement of worn or damaged parts;
- schedules of routine testing of electrical equipment (as recommended by specific suppliers);
- spare parts lists;
- particular technical data of equipment;
- preference list, including local agents for the supply and repairs of specific equipment;
- all schematic wiring diagrams pertaining to technical equipment.

The Contractor shall in addition to supplying the above information, undertake to instruct departmental staff and satisfy himself that they are capable of operating all equipment when it has been commissioned.

The Contractor shall provide a plant operator for 12 months. The Contractor will provide accommodation and cater for the plant operator for the 12-month duration.

PP-22.0: MEASUREMENT AND PAYMENT

The tender shall be accompanied by a schedule of quantities based on the payment items as specified in SABS 1200, which clearly indicates how the tendered cost of the works have been determined. A separate priced schedule of quantities shall be provided for each separate structure or component of the work.

Supply and delivery of equipment and materials shall be priced separately from installation and commissioning in the Schedule of Quantities.

All rates, provisional sums and prices under supply and delivery of equipment and materials shall include for supply/manufacture, delivery to site, off-loading and storing.

All rates, provisional sum and prices under installation and commissioning of equipment and materials shall include for all design (including assessment of specific site conditions), labour, materials, plant, supervision, handling, installation, testing, commissioning and maintenance for a 12 month period.

All the above to be in accordance with specification.

PP-22.1 Package Plant

(a) Supply, install and commission 150m³ mobile wastewater treatment package plant complete with piping, valves ,fittings, electrical components.

Sewage package plant……..Unit: Prov Sum

The contractor will be requested to source and provide quotations to be approved by the engineer. This includes all components that are required to achieve the specified operation and all necessary connections to control panels and power source. Consideration will only be given for mild steel package plants or better.

PP-22.2

Water Storage Tanks ……..Unit: No

PP-22.4 Relocation of Park home ……..Unit: Sum

Shall be priced as a sum. This includes Relocation of Park Home including sewer, water and electrical connections to Park Home

PSMF-4.4.2 Clear trees, shrubs and remove unwanted material ……..Unit: m²

Shall be priced in m². This includes clearing trees, shrubs, and removal of unwanted material for the 100m x 5m gravel access road to package plant. The contractor shall only construct the access road after getting an instruction from the engineer stating how the access road is to be constructed.

PARTICULAR SPECIFICATION PLA : LABOUR – INTENSIVE CONSTRUCTION

LIC 1.1 Scope
This specification establishes general requirements for activities which are to be executed by hand involving the following:

a) Trenches having a depth of less than 1.5 metres
b) Stormwater drainage
c) low-volume roads and sidewalks

LIC 1.2 Precedence

Where this specification is in conflict with any other standard or specification referred to in the Scope of Works to this Contract, the requirements of this specification shall prevail.

LIC 1.3 Trench excavation:

All hand excavatable material in trenches having a depth of less than 1,5 metres shall be excavated by hand.

Compaction of backfilling to trenches (areas not subject to traffic):

Backfilling to trenches shall be placed in layers of thickness (before compaction) not exceeding 100mm. Each layer shall be compacted using hand stampers

a) to 90% Proctor density;
b) such that in excess of 5 blows of a dynamic come penetrometer (DCP) is required to penetrate 100 mm of the backfill, provided that backfill does not comprise more than 10% gravel of size less than 10mm and contains no isolated boulders, or
c) such that the density of the compacted trench backfill is not less than that of the surrounding undisturbed soil when tested comparatively with a DCP.

LIC 1.3.1 Excavation:

All hand excavatable material including topsoil classified as hand excavatable shall be excavated by hand. Harder material may be loosened by mechanical means prior to excavation by hand.
The excavation of any material which presents the possibility of danger or injury to workers shall not be excavated by hand.

LIC 1.3.2 Clearing and grubbing:

Grass and small bushes shall be cleared by hand.

LIC 1.3.3 Shaping:

All shaping shall be undertaken by hand.

LIC 1.3.4 Loading:

All loading shall be done by hand, regardless of the method of haulage.

LIC 1.3.5 Haul:

Excavation material shall be hauled to its point of placement by means of wheelbarrows where the haul distance is not greater than 150 m.

LIC 1.3.6 Offloading:

All material, however transported, is to be off- loaded by hand, unless tipper-trucks are utilised for haulage.

LIC 1.3.7 Spreading:

All material shall be spread by hand.

LIC 1.3.8 Compaction:
Small areas may be compacted by hand provided that the specified compaction is achieved.

LIC 1.3.9 Grassing:

All grassing shall be undertaking by sprigging, sodding, or seeding by hand.

LIC 1.4 Stone pitching and rubble concrete masonry:

All stone required for stone pitching and rubble concrete masonry, whether grouted or dry, must to be collected, loaded, off loaded and placed by hand.

Sand and stone shall be hauled to its point of placement by means of wheelbarrows where the haul distance is not greater than 150m.

Grout shall be mixed and placed by hand.

LIC 1.5 Manufactured Elements:

Elements manufactured or designed by the Contractor, such as manhole rings and cover slabs, precast concrete planks and pipes, masonry units and edge beams shall not individually, have a mass of more than 320kg. In addition the items shall be large enough so that four workers can conveniently and simultaneously acquire a proper hand hold on them.

EMP-ENVIRONMENTAL MANAGEMENT SPECIFICATION

EMP 1.1 DEFINITIONS.

For the purposes of this Specification the definitions and abbreviations given in the applicable specifications listed in 2.1 and the following definitions shall apply:

EMP 1.1.1 Environment means the surroundings within which humans exist and that are made up of -

i) the land, water and atmosphere of the earth;
ii) micro-organisms, plant and animal life;
iii) any part or combination of i) and ii) and the interrelationships among and between them; and
iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

EMP 1.1.2 Potentially hazardous substance is a substance that, in the reasonable opinion of the Engineer, can have a deleterious effect on the environment.

EMP 1.1.3 Method Statement: a written submission by the Contractor to the Engineer in response to the Specification or a request by the Engineer, setting out the plant, materials, labour and method the Contractor proposes using to carry out an activity, identified by the relevant specification or the Engineer when requesting the Method Statement, in such detail that the Engineer is enabled 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 shall 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 Engineer.

reasonable means, unless the context indicates otherwise, reasonable in the opinion of the Engineer after he has consulted with a person, not an employee of the Employer, suitably experienced in "environmental implementation plans" and "environmental management plans" (both as defined in Act No 107,1998).

Solid waste means all solid waste, including construction debris, chemical waste, excess cement/ concrete, wrapping materials, timber, tins and cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).

Contract means the General Conditions of Contract and Special Conditions, Specifications, Drawings, Tender, written records of matters agreed after the submission of the Contractor's tender, Letter of Acceptance and Agreement, together with other documents which the parties have agreed in writing shall form part of the Contract and such amendments or additions to the Contract as may be agreed in writing between the parties.

Contaminated water means water contaminated by the Contractor's activities, *e.g.* concrete water and runoff from plant/ personnel wash areas.

EMP 1.2 MATERIALS

EMP 1.2.1 Materials handling, use and storage

The Contractor shall ensure that any delivery drivers are informed of all procedures and restrictions (including "no go" areas) required to comply with the Specifications. The Contractor shall ensure that these delivery drivers are

supervised during off loading, by someone with an adequate understanding of the requirements of the Specifications.

Materials shall be appropriately secured to ensure safe passage between destinations. Loads including, but not limited to sand, fine vegetation, refuse, paper and cement, shall have appropriate cover to prevent them spilling from the vehicle during transit. The Contractor shall be responsible for any clean-up resulting from the failure by his employees or suppliers to properly secure transported materials.

All manufactured and/ or imported material shall be stored within the Contractor's camp, and, if so required by the Project Specification, out of the rain. All lay down areas outside of the construction camp shall be subject to the Engineer's approval, which shall not unreasonably be withheld.

EMP 1.2.2 Hazardous substances

Hazardous chemical substances (as defined in the Regulations for Hazardous Chemical Substances) used during construction shall be stored in secondary containers. The relevant Material Safety Data Sheets (MSDS) shall be available on Site. Procedures detailed in the MSDS's shall be followed in the event of an emergency situation.

Hazardous and non-hazardous materials shall be separated at site and disposed of in a manner approved by the Engineer.

EMP 1.2.3 Sludge is regarded as a hazardous substance and shall be disposed of at a hazardous waste disposal site approved by the Engineer. The sludge shall not be dried using existing or other sludge drying beds, but shall transfer directly to the hazardous waste disposal site. The Contractor shall supply the Engineer with a certificate of disposal for all disposed sludge.

The trucks transporting the sludge shall be watertight, and the Contractor shall take all reasonable measures to ensure that no sludge is deposited on any public roads during its transfer to the waste disposal site. In the event of a spillage occurring, the Contractor shall clean it up to the satisfaction of the Engineer and the relevant Local Authorities.

EMP 1.3 CONSTRUCTION

EMP 1.3.1 Method Statements

Any Method Statement required by the Engineer or the Project Specification shall be produced within such reasonable time as the Engineer shall specify or as required by the Project Specification. The Contractor shall not commence the activity until the Method Statement has been approved and shall, except in the case of emergency activities, allow a period of two weeks for approval of the Method Statement by the Engineer. Such approval shall not unreasonably be withheld.

The Engineer may require changes to a Method Statement if the proposal does not comply with the specification or if, in the reasonable opinion of the Engineer, the proposal may result in, or carries a greater than reasonable risk of, damage to the environment in excess of that permitted by the Specifications.

Approved Method Statements shall be readily available on the site and shall be communicated to all relevant personnel. The Contractor shall carry out the Works in accordance with the approved Method Statement. Approval of the Method Statement shall not absolve the Contractor from any of his obligations or responsibilities in terms of the Contract.

EMP 1.3.2 Site division

The Contractor shall restrict all his activities, materials, equipment and personnel to within the designated areas as specified by the engineer.

EMP 1.3.3 Site structures

All site establishment components (as well as equipment) shall be positioned to limit visual intrusion on neighbours and the size of area disturbed. The type and colour of roofing and cladding materials to the Contractor's temporary structures shall be selected to reduce reflection.

EMP 1.3.4 Security

The contractor's camp areas shall be fenced with a minimum 1.8 metre high secure fence for the duration of the construction period.

Security guards shall control access to camp areas and to vehicular access routes to the construction site at all times during the construction phase.

Fences shall be checked regularly for breaches and be repaired as necessary.

Strict stock control systems shall be enforced in storage areas, particularly where chemicals, explosives and other potentially dangerous materials are being stored. Checking of stock quantities shall be undertaken immediately prior to contract progress meetings and findings shall be reported at the meetings.

EMP 1.3.5 Transportation of Labour

Labour should be transported to and from the site in vehicles, where possible, arranged by the Contractor to discourage loitering in adjacent areas and possible increase in crime or disturbance. Unsocial activities such as unauthorised consumption or illegal selling of alcohol on the site shall be banned and any persons found to be engaged in such activities shall be removed from site for the duration of the contract and may have criminal action taken against them.

EMP 1.3.6 Informal Settlements

No labour other than essential personnel required for stand-by situations and security shall be housed on the site. Measures shall be put in place, in consultation with the local authority, to prevent squatting on the site and in areas immediately adjacent to the site.

EMP 1.3.7 Lighting

The placement of light sources within the construction site and camp areas must be carefully planned so as to avoid causing a nuisance to residents.

EMP 1.3.8 Eating areas

The Contractor shall designate an eating area for his employees. The Contractor shall provide bins with lids in this area. The waste may be temporarily stored on Site in a central waste area that is weatherproof and scavenger-proof, and which the Engineer has approved.

Any cooking on Site shall be done on well-maintained gas cookers with fire extinguishers present.

EMP 1.3.9 Ablution facilities

Washing, whether of the person or of personal effects and acts of excretion and urination are strictly prohibited other than at the facilities provided.

The Contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are properly stored and removed from Site. Discharge of waste from toilets into the environment or works, and burial of waste is strictly prohibited.

EMP 1.3.10 Lights

The Contractor shall ensure that any lighting installed on the site for his activities does not interfere with road traffic or cause a reasonably avoidable disturbance to the surrounding community or other users of the area.

EMP 1.3.11 "No go" areas

If so required by the Project Specification, certain areas shall be "no go" areas. The Contractor shall ensure that, insofar as he has the authority, no person, machinery, equipment or material enters the "no go" areas at any time.

EMP 1.3.12 Solid waste management

No on-site burying or dumping of any waste materials, vegetation, litter or refuse shall occur. The Contractor shall provide sufficient bins with lids on Site to store the solid waste produced on a daily basis. Bins shall not be

allowed to become overfull and shall be emptied a minimum of once daily. The waste may be temporarily stored on Site in a central waste area that is weatherproof and scavenger-proof, and which the Engineer has approved.

All solid waste shall be disposed of off site at an approved landfill site. The Contractor shall supply the Engineer with a certificate of disposal.

EMP 1.3.13 Emergency procedures

The Contractor's procedures for the following emergencies shall include:
i) Fire
The Contractor shall advise the relevant authority of a fire as soon as one starts and shall not wait until he can no longer control it. The Contractor shall ensure that his employees are aware of the procedure to be followed in the event of a fire.

ii) Accidental leaks and spillages
The Contractor shall ensure that his employees are aware of the procedure to be followed for dealing with spills and leaks, which shall include notifying the Engineer and the relevant authorities. The Contractor shall ensure that the necessary materials and equipment for dealing with spills and leaks is available on Site at all times. Treatment and remediation of the spill areas shall be undertaken to the reasonable satisfaction of the Engineer.

In the event of a hydrocarbon spill, the source of the spillage shall be isolated, and the spillage contained. The area shall be cordoned off and secured. The Contractor shall ensure that there is always a supply of absorbent material readily available to absorb/ breakdown and where possible be designed to encapsulate minor hydrocarbon spillage. The quantity of such materials shall be able to handle a minimum of 200 ℓ of hydrocarbon liquid spill.

EMP 1.3.14 Fire control

No fires may be lit on site. Any fires that occur shall be reported to the Engineer immediately. Smoking shall not be permitted in those areas where it is a fire hazard. Such areas shall include the workshop and fuel storage areas and any areas where the vegetation or other material is such as to make liable the rapid spread of an initial flame. In terms of the Atmospheric Pollution Prevention Act (No. 45 of 1965), burning is not permitted as a disposal method.

The Contractor shall appoint a Fire Officer who shall be responsible for ensuring immediate and appropriate actions in the event of a fire and shall ensure that employees are aware of the procedure to be followed. The Contractor shall forward the name of the Fire Officer to the Engineer for his approval.

The Contractor shall ensure that there is basic fire-fighting equipment available on Site at all times. This shall include at least rubber beaters and at least one fire extinguisher of the appropriate type when welding or other "hot" activities are undertaken.

EMP 1.3.15 Noise

The Contractor shall limit noise levels (e.g. install and maintain silencers on machinery). The provisions of SABS 1200A Subclause 4.1 regarding "built-up areas" shall apply to all areas within audible distance of residents whether in urban, peri-urban or rural areas.

Appropriate directional and intensity settings are to be maintained on all hooters and sirens.

No amplified music shall be allowed on Site. The use of radios, tape recorders, compact disc players, television sets etc shall not be permitted unless the volume is kept sufficiently low as to avoid any intrusion on members of the public within range. The Contractor shall not use sound amplification equipment on Site unless in emergency situations.

Construction activities generating output levels of 85 dB (A) or more, in residential areas, shall be confined to the hour's 08h00 to 17h00 Mondays to Fridays.

Blasting, pneumatic rock drills or other noisy activities should take place during normal working hours. The

community should be notified prior to any planned activities that will be unusually noisy. These activities could include, but are not limited to, blasting and the use of pneumatic rock drills.

Noise suppression measures must be applied to all construction equipment. Construction equipment must be kept in good working order, and where appropriate fitted with silencers which are to be kept in good working order. Should the vehicles or equipment not be in good working order, the Contractor may be instructed to remove the offending vehicle or machinery from site.

Should complaints regarding noise levels be received, as a result of construction activities on the site, these shall be recorded by the ELO, and if the associated operation is programmed to occur over an extended period of longer than two days, then the offending machinery or vehicle shall be identified and remedial measures implemented.

The Contractor shall take measures to discourage labourers from loitering in the area and causing noise disturbance. Where possible labour shall be transported to and from the site by the Contractor or his Sub Contractors by the Contractors own transport.

EMP 1.3.16 Access routes/ haul roads

On the Site, and, if so required by the Project Specification, within such distance of the Site as may be stated, the Contractor shall control the movement of all vehicles and plant including that of his suppliers so that they remain on designated routes, are distributed so as not to cause an undue concentration of traffic and that all relevant laws are complied with. In addition such vehicles and plant shall be so routed and operated as to minimise disruption to regular users of the routes not on the Site. On gravel or earth roads on Site and within 500m of the Site, the vehicles of the Contractor and his suppliers shall not exceed a speed of 45 km/hr.

EMP 1.3.17 Trenching

Trench lengths shall be kept as short as practically possible before backfilling and compacting. All areas disturbed during trenching and pipe laying shall be rehabilitated and revegetated as soon as possible following backfilling and compaction.

EMP 1.3.18 Safety

Telephone numbers of emergency services, including the local fire fighting service, shall be posted conspicuously in the Contractor's office near the telephone.

No unauthorised firearms are permitted on Site.

EMP 1.3.19 Protection of natural features

The Contractor shall not deface, paint, damage or mark any natural features (e.g. rock formations) situated in or around the Site for survey or other purposes unless agreed beforehand with the Engineer. Any features affected by the Contractor in contravention of this clause shall be restored/ rehabilitated to the satisfaction of the Engineer.

Within 500m of the Site the Contractor shall not permit his employees to make use of any natural water sources (e.g. springs, streams, open water bodies) for the purposes of swimming, personal washing and the washing of machinery or clothes.

EMP 1.3.20 Protection of flora and fauna

Except to the extent necessary for the carrying out of the Works, flora shall not be removed, damaged or disturbed nor shall any vegetation be planted without authorisation.

Trapping, poisoning and/ or shooting of animals is strictly prohibited. No domestic pets or livestock are permitted on Site.

Where the use of herbicides, pesticides and other poisonous substances has been specified, they shall be stored, handled and applied with due regard to their potential harmful effects.

The Contractor will follow previously mentioned management guidelines Section 3.1.4 regarding the avoidance of soil degradation.

Construction and delivery vehicles shall only use established roads when transporting items to/from site.

The contractor shall be limited to a maximum working corridor of 5 metres wide through areas of crop, grassland and areas of indigenous vegetation.

The Engineer may instruct that any ecologically valuable plant species, found on site and likely to be disturbed by construction operations shall be removed by suitably qualified personnel (horticulturist) to a location within the alignment area to be instructed by the Engineer.

No plants or animals will be allowed to be caught, collected and consumed on site or removed from site by the Contractor or his personnel or sub-contractors. Any individual caught collecting plant or animal species shall be removed from the site for the duration of the contract and criminal proceedings may be pursued. The Main Contractor shall be held responsible for all infringements of this condition and a penalty of R1000.00 shall be charged for each infringement. An infringement shall be deemed to have occurred for each trap found, each person caught hunting, each animal caught and each plant harvested.
Fires and collection of firewood will not be permitted on or adjacent to site.

EMP 1.3.21 Invasive Weeds

The Contractor shall be responsible for implementing a programme of weed control in the areas of construction.

The spread of exotic species of plants occurring throughout the area shall be controlled. Those species listed as exotic invader species and especially those that are declared weeds, pose the biggest threat to indigenous vegetation, especially through areas of disturbance, and should be the focus of control measures. These species should be completely eradicated from the specified areas through a program of manual removal or use of registered herbicides by experienced weed control experts. Control of weeds shall be in accordance with the requirements of the Conservation of Agricultural Resources Act, No 43 of 1983, section 6.

Weed control is to extend for a minimum 12-month period from completion of construction activities.
Only the minimum area required for construction works will be utilised by the Contractor.

EMP 1.3.22 Stormwater Management and Water Pollution

EMP 1.3.22.1 Phasing of Vegetation Clearance

Vegetation clearance shall be phased to ensure that the minimum area of soil is exposed to potential erosion at any one time. Erosion protection measures in the form of brush packing shall be undertaken as instructed. In addition and if required, revegetation of disturbed surfaces should occur immediately after construction activities are completed in each area.

EMP 1.3.22.2 Physical Measures for the Prevention of Pollution

The site must be managed in order to prevent pollution of drains, downstream watercourses or groundwater, due to suspended solids, silt or chemical pollutants. The following measures shall be implemented to assist in achieving this objective:

- Where necessary grassed or rock pitched diversion ditches or berms are to be used to divert water run off away from exposed soil or construction areas. Silt fences may also be used.
- Separate stormwater collection areas and interceptors at fuel storage areas, batching plants and other potentially polluting activities shall be constructed.
- The use and storage of all materials shall be controlled. Care shall be taken to ensure that fuels and chemicals do not leach into the ground. Adequate spillage containment measures shall be implemented, such as cut off drains, berms etc. Fuel and chemical storage containers shall be set on a concrete plinth. The containment capacity shall be equal to the full amount of material stored. The necessary fire fighting equipment shall be maintained on site to deal with any fire incidents.
- Vehicles shall only be refuelled adjacent to storage facilities; there shall be no refuelling at any other point on the site.

- Any residue from spillage shall be removed from site by appropriate contractors. Handling, storage and disposal of excess or containers of potentially hazardous materials shall be in accordance with the requirements of the Department of Water Affairs and Forestry (DWAF).

EMP 1.3.23 Sanitation and Ablution Facilities

Adequate sanitation and ablution facilities must be provided for construction workers to avoid the use of the open space and water courses as toilets or washing facilities. Toilets and ablution facilities shall be connected to the municipal sewer, as far as possible. Chemical latrines, if used, shall be emptied regularly by a responsible contractor with knowledge of proper sanitation disposal procedures.

In addition, food preparation areas shall be provided with adequate washing facilities and food refuse shall be stored in sealed refuse bins which shall be removed from site at least twice weekly, to prevent the attraction of vermin.

The Contractor shall take steps to ensure that littering by construction workers does not occur and persons shall be employed on the site to collect litter from the site and immediate surroundings.

Skip waste containers shall be maintained on site. These shall be kept covered and arrangements made for them to be collected regularly from site by an appropriate contractor.

EMP 1.3.24 Storage of Materials

The Main Contractor will maintain storage of all potentially polluting materials, and shall undertake potentially polluting operations as far away as practically possible from areas of indigenous vegetation, topsoil/subsoil stockpiles and watercourses. The Contractor will ensure that additional supervisory time is spent to monitor such works. Such materials/operations include (but are not limited to):

- batching, storing of cement, concrete and mortar;
- petrol, oil and chemical storage and transfer;
- washing, ablution and toilet facilities;
- plant storage

All oils and lubricants which are unopened shall be stored in the workshop store on site. Used oils/lubricants will be put into drums and recycled. The Main Contractor will be responsible for ensuring that these used oils/lubricants are not disposed of by dumping pouring on open ground or down drains or in water courses. The main contractor shall ensure that contractors purchasing these materials understand the liability under which they must operate. The Environmental Liaison Officer will be responsible for reporting the storage/use of any other potentially harmful materials to DWAF.

The Environmental Liaison Officer will be responsible for ensuring that potentially harmful materials are properly stored in a dry, secure environment, with concrete or sealed flooring and a means of preventing unauthorized entry. The Environmental Liaison Officer will further ensure that materials storage facilities are cleaned/maintained on a regular basis, and that leaking containers are disposed of in a manner which allows no spillage onto the bare soil. The management of such storage facilities and means of securing them shall be agreed.

No washing of construction vehicles and plant will be allowed on site other than wheel washing. No detergents or chemicals will be used for wheel washing.

Machinery and plant shall keep as far away from watercourses as possible. No washing of vehicles/ plant in natural watercourses shall be allowed.

EMP 1.3.25 Management of Stormwater

Monitor areas of rehabilitated vegetation and effectiveness of brush packing and other erosion protection measures until vegetation has re-covered all areas of exposed soil. Take necessary remedial action in areas where erosion is occurring as part of an ongoing maintenance contract for rehabilitation works.

EMP 1.3.26 Erosion and sedimentation control

The Contractor shall take all reasonable measures to limit erosion and sedimentation due to the construction activities and shall, in addition, comply with such detailed measures as may be required by the Project Specification. Where erosion and/or sedimentation, whether on or off the Site, occurs despite the Contractor complying with the foregoing, rectification shall be carried out in accordance with details specified by the Engineer. Where erosion and/or sedimentation occur due to the fault of the Contractor, rectification shall be carried out to the reasonable requirements of the Engineer.

The Main Contractor shall, prior to the commencement of earthworks determine the average depth of topsoil, and agree this with the Environmental Control Officer, and strip the full depth topsoil from areas affected by construction and related activities prior to the commencement of major earthworks. This shall include access routes, working areas and camp areas.

In areas excavated for foundation construction care shall be taken not to mix topsoil and subsoil during excavation.

No soil stripping shall take place on areas within the site that the Contractor does not require for construction works or areas of retained vegetation.

EMP 1.3.27 Rehabilitation of Compacted Soils

Soils compacted by construction activity shall be deep ripped to loosen compacted layers and re-graded to evenly running levels. Topsoil shall be re-spread over areas to be rehabilitated.

EMP 1.3.28 Use of Fertilisers

All fertilisers used during the construction of the works shall be in accordance with the requirements of the Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, No 36 of 1947. Fertilisers shall not be used excessively and slow release fertilisers and organic products shall be used in preference to highly soluble and inorganic fertilisers.

All fertilisers must be approved by the engineer prior to use on site.

EMP 1.3.29 Pesticides and Herbicides

The use of herbicides and pesticides and other horticultural chemicals shall be carefully controlled wherever these are used. Manufacturers recommendations regarding application rates, safety precautions etc shall be strictly adhered to. In all cases only herbicides and pesticides of low toxicity and low residual activity shall be used. Only glyphosate based herbicides shall be used within 50 metres of any water course.

All horticultural chemicals shall only be stored in strict accordance with manufacturers recommendations and no chemicals shall be kept on site except in locked stores. No unused chemicals shall be disposed of on site but shall be taken to a licensed chemical dump.

All pesticides and herbicides must be approved by the engineer prior to use on site.

EMP 1.3.30 Aesthetics

The Contractor shall take reasonable measures to ensure that construction activities do not have an unreasonable impact on the aesthetics of the area.

EMP 1.3.31 Community relations

If so required by the Project Specification, the Contractor shall erect and maintain information boards in the position, quantity, design and dimensions specified. Such boards shall include contact details for complaints by members of the public in accordance with details provided by the Engineer.

The Contractor shall keep a "Complaints Register" on Site. The Register shall contain all contact details of the person who made the complaint, and information regarding the complaint itself.

EMP 1.3.32 Socio-economic environment

EMP 1.3.32.1 Employment

Unskilled and semi-skilled labour shall largely be recruited from the local communities. Recruitment will take place through formal procurement procedure that includes a positive policy towards the employment of members of previously disadvantaged communities.

Where appropriate, the contractor will undertake training of unskilled and semi-skilled labour.

Where appropriate, labour intensive construction methods should be utilised to maximise the potential number of employment opportunities.

EMP 1.3.32.2 Unsocial Activities on Site

Implementation of security on site by fencing of contractors camp areas and contractors compounds and strictly controlling access through on site security staff.
Controlling vehicular access to all areas of site at all times during the contract period through on site security staff and control gates / booms.

No selling or consuming of alcohol shall be permitted on site and any person found importing alcohol, drugs or illegal substances, shall be removed from the site for the duration of the contract and criminal action may be taken.

EMP 1.3.32.3Loss of crop plants

A photographic record of the existing crop plants that will be affected by the pipeline alignment should be compiled. Compensation rates with the crop owners should be negotiated and the agreed compensation paid to the owners.

The alignment should be rehabilitated to ensure that the growth of the crop plants will not be compromised in the future.

EMP 1.3.33 Cultural environment

EMP 1.3.33.1 Compliance with KwaZulu-Natal Heritage Act

Any possible archaeological / historical finds uncovered during construction must be brought to the attention of and investigated by a qualified archaeologist. Such finds must be reported to the Engineer who shall instruct work in the area of the find to be stopped immediately and shall report the find to the nearest Amafa aKwaZulu Natali (Heritage KwaZulu Natal) office and to the Natal Museum to comply with the KwaZulu-Natal Heritage Act of 1997 (Section 27).

The Contractor shall ensure that his workforce are aware of the necessity of reporting any possible historical or archaeological finds to the ELO so that the appropriate action can be taken. The contractor should be aware that failure to comply with this condition could lead to legal action being taken against him.

EMP 1.3.34 Temporary site closure

If the Site is closed for a period exceeding one week, the Contractor in consultation with the Engineer shall carry out the checklist procedure required by the Project Specification.

EMP 1.4 PLANT

EMP 1.4.1 Fuel (petrol and diesel) and oil

Fuel may be stored on site and the fuel storage area shall be located at the workshop or a fuel storage depot located within the construction camp. The Contractor shall ensure that all liquid fuels (petrol and diesel) are stored in tanks with lids, which are kept firmly shut or in bowsers. The tanks/ bowsers shall be situated on a smooth impermeable surface (plastic or concrete) base with an earth bund (plastic must have sand on top to prevent damage and perishing). The impermeable lining shall extend to the crest of the bund and the volume inside the bund shall be 110% of the total capacity of all the storage tanks/ bowsers. The bunded area shall be covered.

Only empty and externally clean tanks may be stored on the bare ground. All empty and externally dirty tanks shall be stored on an area where the ground has been protected. If fuel is dispensed from 200 litre drums, the proper dispensing equipment shall be used, and the drum shall not be tipped in order to dispense fuel. The dispensing mechanism of the fuel storage tank shall be stored in a waterproof container when not in use.

The Contractor shall prevent unauthorised access into the fuel storage area. No smoking shall be allowed within the vicinity of the fuel storage area. The Contractor shall ensure that there is adequate fire-fighting equipment at the fuel stores.

Where reasonably practical, plant shall be refuelled at the depot or at the workshop as applicable. If it is not reasonably practical then the surface under the refuelling area shall be protected against pollution to the reasonable satisfaction of the Engineer prior to any refuelling activities. The Contractor shall ensure that there is always a supply of absorbent material readily available to absorb/ breakdown and where possible be designed to encapsulate minor hydrocarbon spillage. The quantity of such materials shall be able to handle a minimum of 200 ℓ of hydrocarbon liquid spill. This material must be approved by the Engineer prior to any refuelling or maintenance activities.

EMP 1.4.2 Contaminated water

The Contractor shall set up a contaminated water management system, which shall include collection facilities to be used to prevent pollution, as well as suitable methods of disposal of contaminated water.

The Contractor shall prevent discharge water contaminated with any pollutants, such as cements, concrete, lime, chemicals and fuels, into the works or into any drainage line, stream, river or other wetland. The Contractor shall not discharge the water used in cleaning the equipment into the works.

The Engineer's approval will be required prior to the discharge of contaminated water to a Municipal sewer system.

The Contractor shall notify the Engineer immediately of any pollution incidents on Site.

EMP 1.4.3 Concrete batching area

Concrete shall not be mixed directly on the ground. All contaminated water resulting from batching of concrete shall be disposed of via the wastewater management system, and shall not be discharged into the works.

EMP 1.4.4 Workshop, equipment maintenance and storage

Where practical, all maintenance of equipment and vehicles on Site shall be performed in the workshop. If it is necessary to do maintenance outside of the workshop area, the Contractor shall obtain the approval of the Engineer prior to commencing activities.

The Contractor shall ensure that in his workshop and other plant maintenance facilities, including those areas where, after obtaining the Engineer's approval, the Contractor carries out emergency plant maintenance, there is no contamination of the soil or vegetation. The workshop shall have a smooth impermeable (concrete or thick plastic covered with sand) floor. The floor shall be bunded and sloped towards an oil trap or sump to contain any spillages of substances (e.g. oil). When servicing equipment, drip trays shall be used to collect the waste oil and other lubricants. Drip trays shall also be provided in construction areas for stationary plant (such as compressors) and for "parked" plant (such as scrapers, loaders, vehicles).

All vehicles and equipment shall be kept in good working order and serviced regularly. Leaking equipment shall be repaired immediately or removed from the Site. When servicing or refuelling equipment, drip trays shall be used to collect the waste oil and other lubricants.

The washing of equipment shall be restricted to urgent or preventative maintenance requirements only. All washing shall be undertaken in the workshop or maintenance areas, and these areas must be equipped with a suitable impermeable floor and sump/oil trap. The use of detergents for washing shall be restricted to low

phosphate and nitrate containing, low subsiding-type detergents.

EMP 1.4.5 Dust

The Contractor shall take all reasonable measures to minimise the generation of dust as a result of construction activities to the satisfaction of the Engineer. Appropriate dust suppression measures, e.g. dampening with water, shall be used when dust generation is unavoidable, particularly during prolonged periods of dry weather in summer.

During high wind conditions, the Contractor shall comply with the Engineer instructions regarding dust-damping measures. The Engineer may request the temporary cessation of all construction activities were wind speeds are unacceptably high, and until such time as wind speeds return to acceptable levels.

The Contractor will dampen all exposed soil surfaces including; access roads, works areas and camp areas with a water bowser or sprinklers, as necessary to minimise dust problems. Mitigation will be especially significant during extended dry periods or due to particular operations such as soil stripping, blasting or excavation at which times damping down shall take place on a continual basis.

The Contractor will commence rehabilitation of exposed soil surfaces as soon as practical after completion of earthworks. This includes the grassing of any cut and fill soil slopes immediately on completion of earthworks.

The regular maintenance of plant and machinery will be undertaken to ensure that gaseous emissions are minimised. The Contractor shall ensure that his Sub Contractors comply with this condition. Any offending machinery or plant may be instructed to be removed from site.

Cooking will only be permitted in designated areas by approved vendors. Only gas operated cookers will be permitted. All food preparation areas shall be operated to hygienic standards and shall be regularly inspected by the Environmental Liaison Officer.

The Contractor must further ensure that any grass or weed vegetation left in a natural state and adjacent to cooking areas shall be cut to prevent fires, especially during the dry months.

Blasting shall be carried out in accordance with legislation using optimal and not excessive quantities of explosives. The manufacturers recommended mitigation measures shall be applied, such as blankets and watering down of surfaces. Blasting shall only occur on calm days. All explosive material, if retained on site, shall be stored in a secure and separately designated area. If any rock removal is found to be necessary within 500 metres of any existing buildings, alternative methods of rock removal shall be considered.

Existing vegetation will assist in screening the site, control dust and help prevent soil erosion.

Areas of indigenous vegetation shall be fenced off during construction as instructed by the engineer.

All existing vegetation on and adjacent to the pipe alignment shall be retained.

Should it become necessary to undertake bush clearance, all areas of clearance and removal of individual trees shall only be undertaken after approval by the engineer, who shall inspect the area of proposed clearance with the ECO. Should the contractor not aTendere by this condition a penalty of R1000.00 shall be imposed on him for each area of shrub / herbaceous vegetation or each individual tree removed without approval. The contractor shall also be responsible for immediate rehabilitation of the area affected to the satisfaction of the engineer and at his own cost.

EMP 1.5 FINES FOR NON COMPLIANCE WITH THE TERMS AND CONDITIONS OF THIS ENVIRONMENTAL MANAGEMENT PLAN.

Fines will be issued for the transgressions listed below. Fines may be issued per incident at the discretion of the Engineer. Such fines will be issued in addition to any remedial costs incurred as a result of non-compliance with the environmental specifications. The Engineer will inform the Contractor of the contravention and the amount of the fine, and will deduct the amount from monies due under the Contract.

Fines for the activities detailed below, will be imposed by the Engineer on the Contractor and/or his Sub-contractors.

a.	Any employee's, vehicles, plant, or thing related to the Contractors operations operating within the designated boundaries of a "no-go" area.	R 5 000
b.	Any vehicle driving in excess of designated speed limits.	R 1 000
c.	Employees walking, any vehicle being driven, and items of plant or materials being parked or stored outside the demarcated boundaries of the site.	R 2 000
d.	Persistent and un-repaired oil leaks from machinery.	R 3 000
e.	Persistent failure to monitor and empty drip trays timeously.	R 1 000
f.	Persistent spillage of sludge on public roads due to the Contractors negligence.	R 5 000
g.	The use of inappropriate methods for refuelling.	R 1 000
h.	Litter on site associated with construction activities.	R 1 000
i.	Deliberate lighting of illegal fires on site.	R 5 000
j.	Any employee eating meals on site, outside of the defined eating area.	R 1 000
k.	Employees not making use of the site ablution facilities.	R 1 000
l.	Failure to implement specified noise controls.	R 1 000
m.	Failure to empty waste bins on a regular basis.	R 1 000
n.	Inadequate dust control.	R 3 000
o.	A spillage, pollution, fire or any damage to on site flora or any wetland River resulting from negligence on the part of the Contractor.	R 10 000
p.	The use of inappropriate handling and disposal methods for the sludge and effluent.	R 5 000
q.	An individual littering on the site	R 20
r.	An individual making an illegal fire on site	R 20 - 200
s.	An individual using a funnel for refuelling rather than a pump	R 20
t.	An individual performing an ablution anywhere other than in a toilet	R 20
u.	An individual eating a meal outside of the defined eating area	R 20

For each subsequent similar offence the fine shall be doubled in value to a maximum value of R30,000.

The Engineer shall be the judge as to what constitutes a transgression in terms of this clause, subject to the provisions of Clause 60(1) of the General Conditions of Contract. In the event that transgressions continue the Contractors attention is drawn to the provisions of Sub-clause 58(1)(b)(vi) of the General Conditions of Contract under which the Engineer may cancel the Contract.

EMP 1.6 ENVIRONMENTAL MANAGEMENT COMPLIANCE

EMP 1.6.1 ENVIRONMENTAL OFFICERS

The Main Contractor shall appoint an Environmental Liaison Officer (ELO) for the duration of the construction period. The ELO shall be a senior member of the construction team and have overall environmental management responsibilities on the site.

The ELO is to monitor the activities of the Main Contractor and all subcontractors, and is to ensure that mitigation measures contained in this document are adhered to. The ELO is to liase with the Environmental Control Officer (ECO) on a regular basis so as to inform the ECO of the adherence to and effectiveness of the prescribed management measures. The ECO shall be appointed by the Developer. Any new, or amendments to existing, mitigation measures to address areas of concern notified by the ECO are to be acted on as necessary by the Main Contractor.

The Developer will be responsible for maintaining communication channels with I&APs throughout the Construction Phase. A record of all correspondence with I&APs should be kept by the Developer noting the date, details of the I&AP, details of correspondence, details of any issues discussed and details of any follow-up action taken. All communications with I&APs received by the ECO, ELO or other members of the Development Team shall be referred to the Developer to ensure that these are properly recorded and the appropriate action taken.

During the operational phase, the developer will be responsible for environmental management of the development. The ELO will be responsible for ongoing environmental management, compliance with this report, and community liaison which includes responding to concerns and complaints voiced by any Interested and Affected Party (I&AP).

EMP1.7 COMPLIANCE MONITORING AND AUDITS

The Environmental Liaison Officer will conduct regular monitoring of the Construction Phase to ensure compliance with this EMP and keep records of such monitoring. The results of this monitoring will be reported to the Main Contractor, the Developer and the ECO in the form of a compliance monitoring report which must be submitted monthly during the Construction Phase. The ELO shall also keep records of non-compliance and how this was rectified, and this must be reported to Main Contractor, the Developer, the ECO and the Environmental Committee in order that they can follow up if necessary.

Environmental Audits will be undertaken by the ECO and the ELO on a monthly basis during the Construction Phase and annually during the Operation Phase. The results of these audits will be included in EMP Compliance Reports to be submitted to the Department of Agriculture and Environmental Affairs (DAEA). DAEA, through their Inspectorate will also be involved in monitoring procedures as necessary.

EMP1.8 COMPLIANCE

The EMP will be considered an extension of the Conditions of Approval as set forth by DAEA. Non-compliance with the EMP will constitute non-compliance with said Conditions.

The EMP will be made binding on all contractors operating on the site and will be included within the Contractual Clauses. According to the DAEA Standard Conditions for EIA Approval, non-compliance with, or any deviation from, the conditions set out in the document constitutes a failure in compliance with the approval. Such failure in compliance will be dealt with in terms of Sections 29, 30, and 31 of the Environment Conservation Act (Act No. 73 of 1989), as well as any other appropriate legal mechanisms.

It should be noted that in terms of the Environment Conservation Act, those responsible for Environmental Damage (in this case the Contractor) must pay the repair costs both to the environment and human health and the preventative measures to reduce or prevent further pollution and / or environmental damage (The polluter pays principle).

EMP 1.9 TOLERANCES

Environmental management is concerned not only with the final results of the Contractor's operations to carry out the Works but also with the control of how those operations are carried out. Tolerance with respect to environmental matters applies not only to the finished product but also to the standard of the day-to-day operations required to complete the Works.

It is thus required that the Contractor shall comply with the environmental requirements on an ongoing basis and any failure on his part to do so will entitle the Engineer to certify the imposition of a fine subject to the conditions in the Pro Forma: Protection of the Environment and the details set out in the Project Specification.

EMP 1.9 PROTECTION OF THE ENVIRONMENT

The Contractor will not be given right of access to the Site until this form has been signed

3. I/ we,…..{Contractor} record as follows1. I/ we, the undersigned, do hereby declare that I/ we am/ are aware of the increasing requirement by society that construction activities shall be carried out with due regard to their impact on the environment.

2. In view of this requirement of society and a corresponding requirement by the Employer with regard to this Contract, I/ we will, in addition to complying with the letter of the terms of the Contract dealing with protection of the environment, also take into consideration the spirit of such requirements and will, in selecting appropriate employees, plant, materials and methods of construction, in-so-far as I/ we have the choice, include in the analysis not only the technical and economic (both financial and with regard to time) aspects but also the impact on the environment of the options. In this regard, I/ we recognised and accept the need to a Tender by the “precautionary principle” which aims to ensure the protection of the environment by the adoption of the most environmentally sensitive construction approach in the face of uncertainty with regard to the environmental implications of construction.

3. I/ we acknowledge and accept the right of the Employer to deduct, should he so wish, from any amounts due to me/ us, such amounts (hereinafter referred to as fines) as the Engineer shall certify as being warranted in view of my/ our failure to comply with the terms of the Contract dealing with protection of the environment, subject to the following:

3.1 The Engineer may impose such fine on–y -

3.1.1 if he is reasonably satisfied of my/ our failure to comply with the terms of the Contract dealing with protection of the environment

3.1.2 if he is reasonably satisfied that it is necessary to impose such fine in order to achieve future compliance

3.1.3 after he has consulted with a person suitably experienced in "environmental implementation pl”ns" a“d "environmental management pl”ns" (both as defined in Act No 107,1998) as to whether there has been a failure to comply with a terms of the Contract dealing with protection of the environment and as to a reasonable amount of the fine

3.2 The Engineer, in determining the amount of such fine, shall take into account *inter alia*, the nature of the offence, the seriousness of its impact on the environment, the degree of prior compliance/non-compliance, the extent of the Contrac’or's overall compliance with environmental protection requirements and, in particular, the extent to which he considers it necessary to impose a sanction in order to eliminate/reduce future occurrences

3.3 The Engineer shall, with respect to any fine imposed, provide me/ us with a written statement giving details of the offence, the facts on which the Engineer has based his assessment and the terms of the Contract (by reference to the specific clause) which has been contravened.

3.4 At the sole discretion of the Engineer, the Engineer may at any time before one month after the issue of the Certificate of Completion (for the last completed portion of the Works should there be more than one), reverse all or some, in whole or in part, of previously imposed fine and shall include such reversed payment in a subsequent Payment Certificate.

3.5 The sum total of all fines retained by the Employer after the processing of any Payment Certificate issued up to one month after the issue of the Certificate of Completion referred to above, shall, within one month be paid by the Employer to a charity mutually agreed upon by the Contractor and the Employer, failing which agreement, as determined by the Engineer following consultation with the two parties.

Signed ..... Date.....
CONTRACTOR

Witnesses:

……

……

C3.5.3.5 ADDITIONAL SPECIFICATION – EMPLOYMENT AND TRAINING OF YOUTH WORKERS.

3.5.3.5 Additional specification – Employment and training of youth workers.

ADDITIONAL SPECIFICATIONS

SL: EMPLOYMENT AND TRAINING OF YOUTH WORKERS ON THE EXPANDED PUBLIC WORKS PROGRAMME (EPWP) Infrastructure Projects: NATIONAL YOUTH SERVICE (NYS)

CONTENTS

SL 01 - SCOPE

This project is part of the Expanded Public Works Programme and the National Youth Service Programme and aims to train young people and provide them with practical work experience as part of this programme. Youth aged between 18 and 35 will be recruited and trained in skills relevant to the work to be done on this project. These youth will have to be employed by the contractor as part of this project so that they can gain their work experience on these projects. The training of the youth will be coordinated and implemented by a separate service provider. This service provider will provide the contractor with a list of all the youth and the training each of these youth have received. The Contractor will be required to employ all of these youth for a minimum period of 6 months.

Furthermore the Contractor will be required to supervise these youth to ensure that the work they perform is of the required standard. If necessary the contractor's staff will be required to assist and mentor the youth to ensure that they are able to perform the type of work they need to do to the satisfactory standards required. The contractor will not be required to employ all youth in the programme at the same time, but may rotate the youth on the project, as long as all youth are employed for the minimum duration stated earlier.

This specification contains the standard terms and conditions for workers employed in elementary occupations and trained on a Special Public Works Programme (SPWP) for the National Youth Services Programme. These terms and conditions do NOT apply to persons employed in the supervision and management of a SPWP.

SL 02 - TERMINOLOGY AND DEFINITIONS

SL 02.01 – TERMINOLOGY

- SPWP - The Code of Good Practice for Special Public Works Programmes, which has been gazetted by the Department of Labour, and which provides for special conditions of employment for these EPWP projects. In terms of the Code of Good Practice, the workers on these projects are entitled to formal training, which will be provided by training providers appointed (and funded) by the Department of Labour. For projects of up to six months in duration, this training will cover life-skills and information about other education, training and employment opportunities.

- EPWP - Expanded Public Works Programme, a National Programme of the government of South Africa, approved by Cabinet.

- NYDA National Youth Development Agency.
- DOL Department of Labour.

SL 02.02 - DEFINITIONS

(a) "employer" **-** means the contractor or any party employing the worker /beneficiary under the EPWP – NYS Programme.

(b) "client" **-** means the Department of Public Works.

(c) "Worker / trainee" **-** means any person working or training in an elementary occupation on a SPWP.

SL 03 - APPLICABLE LABOUR LAWS

In line with the Expanded Public Works Programme (EPWP) policies, the Ministerial Determination, Special Public Works Programmes, issued in terms of the Basic Conditions of Employment Act of 1997 by the Minister of labour in government Notice No. R63 of 25 January 2002, of which extracts have been reproduced below in clauses SL 04, shall apply to works described in the scope of work and which are undertaken by unskilled or semi-skilled workers.

The Code of Good Practise for Employment and Conditions of Work for Special Public Works Programmes, issued in terms of the Basic Conditions of Employment Act of 1997 by the Minister of Labour in Government Notice No. R64 of 25 January 2002 shall apply to works described in the scope of work and which unskilled or semi-skilled workers undertake.

SL 04 - EXTRACTS FROM MINISTERIAL DETERMINATION REGARDING SPWP

SL 04.01 – <u>DEFINITIONS</u>

In this specification –

"department" means any department of the State, implementing agent or contractor;
"employer" means any department that hires workers to work in elementary occupations on a SPWP;

"worker" means any person working in an elementary occupation on a SPWP;

"elementary occupation" means any occupation involving unskilled or semi- skilled work;

"management" means any person employed by a department or implementing agency to administer or execute a SPWP;

a. "task" means a fixed quantity of work;
b. "task-based work" means work in which a worker is paid a fixed rate for performing a task;
c. "task-rated worker" means a worker paid on the basis of the number of tasks completed;
d. "time-rated worker" means a worker paid on the basis of the length of time worked
e. "Service Provider" means the consultant appointed by Department to coordinate training of labour/ participants on EPWP infrastructure projects.

SL 04.02 - <u>TERMS OF WORK</u>

- Workers on a SPWP are employed on a temporary basis.

- A worker may NOT be employed for longer than 24 months in any five-year cycle on a SPWP.

- Employment on a SPWP does not qualify as employment and a worker so employed does not have to register as a contributor for the purposes of the Unemployment Insurance Act 30 of 1966.

SL 04.03 - <u>NORMAL HOURS OF WORK</u>

An employer may not set tasks or hours of work that require a worker to work–

- more than forty hours in any week
- on more than five days in any week; and
- for more than eight hours on any day.

An employer and a worker may agree that the worker will work four days per week. The worker may then work up to ten hours per day.

A task-rated worker may not work more than a total of 55 hours in any week to complete the tasks (based on a 40-hour week) allocated to him.

Every work is entitled to a daily rest period of at least eight consecutive hours. The daily rest period is measured from the time the worker ends work on one day until the time the worker starts work on the next day.

SL 04.04 - MEAL BREAKS

A worker may not work for more than five hours without taking a meal break of at least thirty minutes duration.

An employer and worker may agree on longer meal breaks.

A worker may not work during a meal break. However, an employer may require a worker to perform duties during a meal break if those duties cannot be left unattended and cannot be performed by another worker. An employer must take reasonable steps to ensure that a worker is relieved of his or her duties during the meal break.

A worker is not entitled to payment for the period of a meal break. However, a worker who is paid on the basis of time worked must be paid if the worker is required to work or to be available for work during the meal break.

SL 04.05 - SPECIAL CONDITIONS FOR SECURITY GUARDS

A security guard may work up to 55 hours per week and up to eleven hours per day.

A security guard who works more than ten hours per day must have a meal break of at least one hour duration or two breaks of at least 30 minutes duration each.

SL 04.06 - DAILY REST PERIOD

Every worker is entitled to a daily rest period of at least eight consecutive hours. The daily rest period is measured from the time the worker ends work on one day until the time the worker starts work on the next day.

SL 04.07 - WEEKLY REST PERIOD

Every worker must have two days off every week. A worker may only work on their day off to perform work which must be done without delay and cannot be performed by workers during their ordinary hours of work (“emergency work”).

SL 04.08 - WORK ON SUNDAYS AND PUBLIC HOLIDAYS

A worker may only work on a Sunday or public holiday to perform emergency or security work.

- Work on Sundays is paid at the ordinary rate of pay.
- A task-rated worker who works on a public holiday must be paid –

a. the worker’s daily task rate, if the worker works for less than four hours;
b. double the worker’s daily task rate, if the worker works for more than four hours.
c. A time-rated worker who works on a public holiday must be paid –

d. the worker's daily rate of pay, if the worker works for less than four hours on the public holiday;
e. double the worker's daily rate of pay, if the worker works for more than four hours on the public holiday.

SL 04.09 - SICK LEAVE

Only workers who work four or more days per week have the right to claim sick-pay in terms of this clause.

A worker who is unable to work on account of illness or injury is entitled to claim one day's paid sick leave for every full month that the worker has worked in terms of a contract.

A worker may accumulate a maximum of twelve days' sick leave in a year.

Accumulated sick-leave may not be transferred from one contract to another contract.

An employer must pay a task-rated worker the worker's daily task rate for a day's sick leave.

An employer must pay a time-rated worker the worker's daily rate of pay for a day's sick leave.

An employer must pay a worker sick pay on the worker's usual payday.

Before paying sick-pay, an employer may require a worker to produce a certificate stating that the worker was unable to work on account of sickness or injury if the worker is –

- absent from work for more than two consecutive days; or
- absent from work on more than two occasions in any eight-week period.

A medical certificate must be issued and signed by a medical practitioner, a qualified nurse or a clinic staff member authorised to issue medical certificates indicating the duration and reason for incapacity.

A worker is not entitled to paid sick-leave for a work-related injury or occupational disease for which the worker can claim compensation under the Compensation for Occupational Injuries and Diseases Act.

SL 04.10 - MATERNITY LEAVE

A worker may take up to four consecutive months' unpaid maternity leave.

A worker is not entitled to any payment or employment-related benefits during maternity leave.

A worker must give her employer reasonable notice of when she will start maternity leave and when she will return to work.

A worker is not required to take the full period of maternity leave. However, a worker may not work for four weeks before the expected date of birth of her child or for six weeks after the birth of her child, unless a medical practitioner, midwife or qualified nurse certifies that she is fit to do so.

- A worker may begin maternity leave –
- four weeks before the expected date of birth; or
- on an earlier date –
- if a medical practitioner, midwife or certified nurse certifies that it is necessary for the health of the worker or that of her unborn child; or
- if agreed to between employer and worker; or
- on a later date, if a medical practitioner, midwife or certified nurse has certified that the worker is able to continue to work without endangering her health.

- A worker who has a miscarriage during the third trimester of pregnancy or bears a stillborn child may take maternity leave for up to six weeks after the miscarriage or stillbirth.

- A worker who returns to work after maternity leave, has the right to start a new cycle of twenty-four months employment, unless the SPWP on which she was employed has ended.

SL 04.11 - <u>FAMILY RESPONSIBILITY LEAVE</u>

- Workers, who work for at least four days per week, are entitled to three days paid family responsibility leave each year in the following circumstances –

  - when the employee's child is born;
  - when the employee's child is sick;
  - in the event of the death of –

-
- the employee's spouse or life partner
- the employee's parent, adoptive parent, grandparent, child, adopted child, grandchild or sibling

SL 04.12 - <u>STATEMENT OF CONDITIONS</u>

- An employer must give a worker a statement containing the following details at the start of employment –
- the employer's name and address and the name of the SPWP;
- the tasks or job that the worker is to perform;
- the period for which the worker is hired or, if this is not certain, the expected duration of the contract;
- the worker's rate of pay and how this is to be calculated;
- the training that the worker may be entitled to receive during the SPWP.

- An employer must ensure that these terms are explained in a suitable language to any employee who is unable to read the statement.

- An employer must supply each worker with a copy of the relevant conditions of employment contained in this specification.

- An employer must enter into a formal contract of employment with each employee. A copy of a pro-forma is attached at the end of this specification.

SL 04.13 - <u>KEEPING RECORDS</u>

- Every employer must keep a written record of at least the following –
- the worker's name and position;
- in the case of a task-rated worker, the number of tasks completed by the worker;
- in the case of a time-rated worker, the time worked by the worker;
- payments made to each worker.
- The employer must keep this record for a period of at least three years after the completion of the SPWP.

SL 04.14 – <u>PAYMENT</u>

- A task-rated worker will only be paid for tasks that have been completed.

- An employer must pay a task-rated worker within five weeks of the work being completed and the work having been approved by the manager or the contractor having submitted an invoice to the employer. Payment must be made in cash, by cheque or by direct deposit into a bank account designated by the worker.

- A time-rated worker will be paid at the end of each month and payment must be made in cash, by cheque or by direct deposit into a bank account designated by the worker.

- Payment in cash or by cheque must take place –
- at the workplace or at a place agreed to by at least 75% of the workers; and
- during the worker's working hours or within fifteen minutes of the start or finish of work;
- All payments must be enclosed in a sealed envelope which becomes the property of the worker.

- An employer must give a worker the following information in writing –
- the period for which payment is made;
- the number of tasks completed or hours worked;
- the worker's earnings;
- any money deducted from the payment;
- the actual amount paid to the worker.

- If the worker is paid in cash or by cheque, this information must be recorded on the envelope and the worker must acknowledge receipt of payment by signing for it.
- If a worker's employment is terminated, the employer must pay all monies owing to that worker within one month of the termination of employment.

SL 04.15 – DEDUCTIONS

- An employer may not deduct money from a worker's payment unless the deduction is required in terms of a law.

- An employer must deduct and pay to the SA Revenue Services any income tax that the worker is required to pay.

- An employer who deducts money from a worker's pay for payment to another person must pay the money to that person within the time period and other requirements specified in the agreement law, court order or arbitration award concerned.

- An employer may not require or allow a worker to –
- repay any payment except an overpayment previously made by the employer by mistake;
- state that the worker received a greater amount of money than the employer actually paid to the worker; or
- pay the employer or any other person for having been employed.

SL 04.16 - HEALTH AND SAFETY

- Employers must take all reasonable steps to ensure that the working environment is healthy and safe and that all legal requirements regarding health and safety are strictly adhered to.

- A worker must:
- work in a way that does not endanger his/her health and safety or that of any other person;
- obey any health and safety instruction;
- obey all health and safety rules of the SPWP;
- use any personal protective equipment or clothing issued by the employer;
- report any accident, near-miss incident or dangerous behaviour by another person to their employer or manager.

SL 04.17 - COMPENSATION FOR INJURIES AND DISEASES

- It is the responsibility of employers to arrange for all persons employed on a SPWP to be covered in terms of the Compensation for Occupational Injuries and Diseases Act, 130 of 1993.

- A worker must report any work-related injury or occupational disease to their employer or manager.
-
- The employer must report the accident or disease to the Compensation Commissioner.

- An employer must pay a worker who is unable to work because of an injury caused by an accident at work 75% of their earnings for up to three months. The employer will be refunded this amount by the Compensation Commissioner. This does NOT apply to injuries caused by accidents outside the workplace such as road accidents or accidents at home.

SL 04.18 – TERMINATION

- The employer may terminate the employment of a worker provided he has a valid reason and after following existing termination procedures.
- A worker will not receive severance pay on termination.
- A worker is not required to give notice to terminate employment. However, a worker who wishes to resign should advise the employer in advance to allow the employer to find a replacement.
- A worker who is absent for more than three consecutive days without informing the employer of an intention to return to work will have terminated the contract. However, the worker may be re-engaged if a position becomes available for the balance of the 24-month period.
- A worker who does not attend required training events, without good reason, will have terminated the contract. However, the worker may be re-engaged if aposition becomes available for the balance of the 24-month period.

SL 04.19 - CERTIFICATE OF SERVICE

On termination of employment, a worker is entitled to a certificate stating –

- the worker's full name;
- the name and address of the employer;
- the SPWP on which the worker worked;
- the work performed by the worker;
- any training received by the worker as part of the SPWP;
- the period for which the worker worked on the SPWP;
- any other information agreed on by the employer and worker.

SL 05 EMPLOYER'S RESPONSIBILITIES

The employer shall adhere to the conditions of employment as stipulated in the *Code of Good Practice for Employment and Conditions of Work for Special Public Works Programmes*. Over and above the conditions stipulated above, he shall be responsible to:

(a) formulate and design a contract between himself/ herself and each of the recruited youth workers, ensuring that the contract does not contravene any of the Acts stipulated in South African Law, e.g. Basic Conditions of Employment Act, etc. (A copy of a pro-forma contract is attached at the end of this specification);

(b) screen and select suitable candidates for employment from the priority list of youth workers provided by the National Youth Development Agency;

(c) ensure that the recruited youth workers are made available to receive basic life skills training which will be conducted and paid for by the National Youth Development Agency or an appointed Training Provider;

(d) ensure that all youth workers receive instruction on safety on site prior to them commencing with work on site;

(e) ensure that all youth workers are covered under workmen's compensation for as long as they are contracted to the contractor. Payment to the Compensation Commissioner shall be the responsibility of the contractor;

(f) assist in the identification and assessment of potential youth workers to undergo advanced technical training in respective trades;

(g) test and implement strict quality control and to ensure that the health and safety regulations are adhered to;

(h) provide all youth workers with the necessary protective clothing as required by law for the specific trades that they are involved in.

(i) provide overall supervision and day-to-day management of youth workers and/or sub-contractors; and

(j) ensure that all youth workers are paid their wages on time through a pre-agreed payment method as stipulated in the contract with the youth worker.

SL 06 - PLACEMENT OF RECRUITED YOUTH WORKERS

Employers will be contractually obliged to:

(a) employ youth workers from targeted social groups from the priority list provided by the DPW.

(b) facilitate on-the-job training and skills development programmes for the youth workers;

(c) achieve the following minimum employment targets:

- 100% people between the ages of 18 and 35
- 60% women;
- 2% people with disabilities.

(d) brief youth workers on the conditions of employment as specified in sub clause SL 04.09 above;

(e) enter into a contract with each youth worker, which contract will form part of the Employment Agreement;

(f) allow youth workers the opportunity to attend life skills training through NYDA. This shall be arranged at the beginning of the contract;

(g) ensure that payments to youth workers are made as set out in sub clauses SL 04.14 and SL 04.15 above.

(h) set up of personal profile files as prescribed by Service Provider and as set out in sub clause SL 04.13 above.

(i) in addition to (h)- a copy of the I.D;

- qualifications;
- career progress; e.g.

- Status of technical improvement,
- Willingness to work,
- Leadership capabilities,
- Discipline; and
- Any other factors that can assist DPW-HR with the placement of the youth workers at the end of the programme

- EPWP Employment Agreement, and
- list of trade tools;

Must be included in the youth worker's personal profile file.

SL 07 - TRAINING OF YOUTH WORKERS

Three types of training are applicable, namely:

1. Life Skills;
2. Technical Skills training.
3. On the job training.

Training will be implemented by training facilitators /instructors accredited by CETA or QCTO:

Youth workers shall be employed on the projects for an average of 6 months (On-site training).

Youth workers shall be deployed on projects in the vicinity of their homes. The same arrangements as for other workers regarding accommodation, subsistence and travel shall be

applicable to youth workers.

(a). Life Skills Training

All youth workers are entitled to undergo life skills training. Training of this module will be flexible enough to meet the needs of the employer. Training should take place immediately after site hand-over and during the period of site establishment and pre-planning before actual construction starts, alternatively this will be spread over the duration of the contract period. The contractor will be required to work closely with the person to schedule the training sessions so that the timing of the training is aligned with the contractors work schedule and his demand for workers.

(b). Technical Skills Training

The Employer shall assist in identifying youth workers for further training. These youth workers will undergo further technical training to prepare them for opportunities as semi-skilled labourers.

Such training will comprise of an off-site theoretical component and practical training on-site. The contractor will be responsible for on-site practical work under his supervision. Youth workers who graduate from the first phase of the training programme will be identified and given opportunities to register for skills development programmes. These can ultimately result in an accredited qualification. The programme will consist of theoretical instruction away from the construction site as well as on-site practical work under the supervision of the employer. Candidates will be entitled to employment to complete all training modules.

(c). On-the job training

The Employer shall provide youth workers with on-the-job training to enable them to fulfil their employment requirements. The employer shall also be expected to closely monitor the job performance of youth workers and shall identify potential youth workers for skills development programmes.

SL 08 - BENEFICIARY (YOUTH WORKERS) SELECTION CRITERIA

SL 08.01- PREAMBLE

The *Code of Good Practise for Employment and Conditions of Work for Special Public Works Programmes* encourages:

- optimal use of locally-based labour in a Special Public Works Programme (SPWP);
- a focus on targeted groups which consist of namely youth, consisting of women, female-headed households, disabled and households coping with HIV/AIDS; and
  the empowerment of individuals and communities engaged in a SPWP through the provision of training.

SL 08.02 - BENEFICIARY (YOUTH WORKERS) SELECTION CRITERIA

The youth workers of the programmes should preferably be non-working individuals from the most vulnerable sections of disadvantaged communities who do not receive any social security pension income. The local community must, through all structures available, be informed of and consulted about the establishment of any EPWP – NYS

In order to spread the benefit as broadly as possible in the community, a maximum of one person per household should be employed, taking local circumstances into account.

Skilled artisans from other areas may be employed if they have skills that are required for a project and there are not enough persons in the local communities who have those skills or who could undergo appropriate skills training. However, this should not result in more than 20% of persons working on a programme not being from local communities.

Programmes should set participation targets for employment with respect to youth, single male- and female-headed households, women, people with disabilities, households coping with HIV/AIDS, people who have never worked, and those in long-term unemployment.

The proposed targets as set out in sub clause SL 06 (c)

- 100% youth from 18 to 35 years of age;
- 60% women;
- 2% disabled.

SL 09 - CONTRACTUAL OBLIGATIONS IN RELATION TO YOUTH LABOUR

The youth workers to be employed in the programme (EPWP-NYS) shall be directly contracted to the employer. Over and above the construction and project management responsibilities, the employer will be expected to perform the tasks and responsibilities as set out in clause SL 05 above.

SL 10 - RATES OF PAY

It is stipulated that youth workers on the EPWP-NYS receive a minimum of R 102.00 per day (as per Ministerial Determination) for both (theoretical and practical training), as revised from time to time. Should youth workers be attending training whilst employed by the contractor, the contractor will still be responsible for payment to the youth worker whilst at training.

SL 11 - MEASUREMENTS AND PAYMENT

The number of youth workers specified for this contract that will receive Orientation, Life Skills development training and Technical training is 40.

SL 11.01 - <u>PAYMENT FOR TRAINING OF YOUTH WORKERS (TARGET: - 40 YOUTH WORKERS)</u>

SL 11.01.01 Orientation and Life Skills development training for youth workers for **10** days per youth worker……..Unit: Prov.Sum

SL 11.01.02 Technical Skills Training for Youth Workers for an average of _____ days per youth worker……..Unit: Prov.Sum

SL 11.01.03 Provide Medical Surveillance

SL 11.01.04 Payment reduction due to not meeting the target as in SL 11.01.01 and

SL 11.01.02…..Unit:
Youth worker …… **LESS R 2 500 per youth worker**

SL 11.01.05 Profit and attendance - (on condition that services and cost have been incurred- on Items 200.01.01 and 200.01.02 above). Unit: 10%

SL 11.02 - <u>PAYMENT FOR TRAVELLING DURING ON-SITE TRAINING</u>

SL 11.02.01 Travelling during On-Site training:

01 Travelling (based on R40 per day return trip/ youth worker) …….Unit: PC.sum
02 Profit and attendance (on items 1 above)…… Unit: %

SL 11.03 - <u>EMPLOYMENT OF YOUTH WORKERS</u>

SL 11.03.01 Employment of Youth Workers…….. Unit: Prov.Sum

The unit of measurement shall be the number of youth workers at the labour rate of R102.00 per day as per Ministerial Determination (as revised on an annual basis) multiplied by the period employed in months and the rate tendered shall include full compensation for all costs associated with the employment of youth workers and for complying with the conditions of contract. The cost for the training shall be excluded from this item. This item is based on 6 months appointment for youth workers.

SL 11.04 - **PROVISION OF EPWP DESIGNED OVERALLS AND HARD HATS TO YOUTH WORKERS**

SL 11.04.01 - Supply 2 x EPWP branded overalls, 1 x EPWP branded hard hat, gloves and safety boots to each youth worker (**allowed R 1 600-00 / youth worker**)..Unit: PC. Sum

Youth worker overalls should be orange (top and bottom) as per EPWP branding specification with the exception of Correctional Services contracts where the overalls should be blue (top and bottom). **A minimum of two (2) Overalls per Youth Worker should be supplied**. Hard hats should be orange and branded as per the EPWP branding specification.

SL 11.04.02 - Profit and attendance Unit: 10%

An amount has been provided in the Schedule of Quantities under sub item SL 11.04.01 for the supply of EPWP designed overalls and hard hat, as per the EPWP branding specification provided by the EPWP unit, and the Service Provider. The Service Provider will have sole authority to spend the amounts or part thereof. The tendered percentage under sub items SL 11.04.02 will be paid to the contractor on the value of each payment pertaining to the supply of overalls and hard hats to cover his expenses in this regard.

SL 11.05 - **PROVISION OF TOOLBOXES FOR YOUTH WORKERS**

SL 11.05.01 Provide all youth workers with prescribed tools for their respective trades. Specification for the mentioned tools to be provided by the Service Provider. These tools will become the property of the youth workers after the completion of the programme (**allowed R 1 800-00 / youth worker**)
…….Unit: PC.Sum

SL 11.05.02 Profit and attendance Unit: %

SL 11.06 - **APPOINTMENT OF YOUTH TEAM LEADER/S**

SL 11.06.01 - Appointment of Youth Team Leader/s for the duration of the contract (**allowed R 3 800-00**). Unit: Prov.Sum

SL 11.07 - **LIAISON WITH SERVICE PROVIDER** Unit: hours

The Youth Team Leader will act as Coordinator/ Supervisor to facilitate the project work between the youth workers and the contractor. (Ratio 1:15).

The tendered rate shall include full compensation for the cost of liaising with the Service Provider and Social Facilitators on all issues regarding the works.

SL 11.08 - **LOGISTICS FOR EXIT WORKSHOP/ GRADUATION**

SL 11.08.01 - Provide logistic items for exit workshop/ graduation (Catering, Orange

EPWP - NYS AGREEMENT

LIMITED DURATION CONTRACT OF EMPLOYMENT

[Example]

FOR

EXPANDED PUBLIC WORKS PROGRAMME

BETWEEN

Company
Name: ……
(herein after referred to as the "**Contractor**")

Company
Address: ……

Contract
Name: ……

AND

Surname and Name/s

……..
(hereinafter referred to as the "**Youth worker**")

Residential Address:

……..

ID number:……..

1. The contractor hereby appoints the Youth worker in terms of a Limited Duration Contract, to work as a youth worker within a Special Public Works Programme (SPWP) Project.
2. This contract must be read in conjunction with the standard terms and conditions of employment applicable to a SPWP, a copy of which is attached
3. The project where you will be employed is referred to as…… and is located at ……..
4. The contract will start on ……and end on……..
5. You must be aware that **this contract is a Limited Duration Contract** and **not a permanent job.** Your minimum period of employment will be 6 months and the contract may be terminated for one of the following reasons:
6. Funding for the programme in your areas comes to an end.
   You repeatedly do not perform in terms of the tasks set out in your work programme.
   If you breach any of the terms and conditions of this contract.
7. You will be employed as a general worker within the contract, you may, depending on the contractor's operational needs, be required to perform other duties that can be reasonably expected of you.
8. You will adhere to the contractors' disciplinary code.
9. You will be required to work your daily hours from …….. to …….. which included your meal break.
10. While you are working you will report to ……
11. You will be paid an time-rate amount of R …….. per hour.
12. The contractor shall not be required to provide to local workers:

    - holiday, leave, sick or severance pay;
    - a pension or similar scheme;
    - a medical aid or similar scheme.

13. Signed on this day …… of …….. 20……

Contractor: …… Date: ……

Youth Worker: …… Date: ……

Witness: …… Date: ……

C3.5.3.6 OCCUPATIONAL HEALTH & SAFETY SPECIFICATION

C.5.3.6 OCCUPATIONAL HEALTH & SAFETY SPECIFICATION

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C.5.3.6 OCCUPATIONAL HEALTH & SAFETY SPECIFICATION

1. GENERAL

1.1 MISSION STATEMENT & STRATEGY

1.1.1 All employees working on the mentioned project are important. They are important to their Companies and to their families.

- Every individual has the right to a safe and healthy workplace and the right to return from work every day healthy and without injury.
- This is the common goal to which we are committed and believe that it can only be achieved by a dedicated, joint effort by all involved.

1.2 DEFINITIONS

The following definitions apply to this Safety, Health and Environmental Specification:

"**agent**" means a competent person who acts as a representative for a client.
"angle of repose" means the steepest angle of a surface at which a mass of loose or fragmented material will remain stationary in a pile on the surface, rather than sliding or crumbling away;
"bulk mixing plant" means machinery, appliances or other similar devices that are assembled in such a manner so as to be able to mix materials in bulk for the purposes of using the mixed product for construction work;
"client" means any person for whom construction work is being performed;
"competent person" means a person who— a) has in respect of the work or task to be performed the required knowledge, training and 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, 2000 (Act No.67 of 2000), those qualifications and that training must be regarded as the required qualifications and training; and b) is familiar with the Act and with the applicable regulations made under the Act;
"construction manager" means a competent person responsible for the management of the physical construction processes and the coordination, administration and management of resources on a construction site;
"construction site" means a work place where construction work is being performed**;**
"construction supervisor" means a competent person responsible for supervising construction activities on a construction site;

"construction vehicle" means a vehicle used as a means of conveyance for transporting persons or material, or persons and material, on and off the construction site for the purposes of performing construction work**;**
"construction work" means 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; or

b) the construction, erection, maintenance, demolition or dismantling of any bridge, dam, canal, road, railway, runway, sewer or water reticulation system; or the moving of earth, clearing of land, the making of excavation, piling, or any similar civil engineering structure or type of work;

"construction work permit" means a document issued in terms of regulation 3

"contractor" means an employer who performs construction work;

"demolition work" means a method to dismantle, wreck, break, pull down or knock down of a structure or part thereof by way of manual labour, machinery, or the use of explosives;

"design" in relation to any structure, includes drawings, calculations, design details and specifications;

"designer" means—

(a) a competent person who—

(i) prepares a design;

(ii) checks and approves a design; or

(iii) arranges for any person at work under his or her control to prepare a design (including an employee of that person where he or she is the employer); or

(iv) designs temporary work, including its components,

(b) an architect or engineer contributing to, or having overall responsibility for a design;

(c) a building services engineer designing details for fixed plant;

(d) a surveyor specifying articles or drawing up specifications;

(e) a contractor carrying out design work as part of a design and building project; or

(f) an interior designer, shop-fitter or landscape architect;

"**excavation work**" means the making of any man-made cavity, trench, pit or depression formed by cutting, digging or scooping;

"explosive actuated fastening device" means a tool that is activated by an explosive charge and that is used for driving bolts, nails and similar objects for the purpose of providing fixing. Change explosive power tools to explosive actuated fastening device;

"fall arrest equipment" means equipment used to arrest a person in a fall, including personal equipment such as body harness, lanyards, deceleration devices, lifelines or similar equipment.

"fall prevention equipment" means equipment used to prevent persons from falling from a fall risk position, including personal equipment, a body harness, lanyards, lifelines or physical equipment such as guardrails, screens, barricades, anchorages or similar equipment;

"fall protection plan" means a documented plan, which includes and provides for-

a) all risks relating to working from a fall risk position, considering the nature of work undertaken;

b) the procedures and methods to be applied in order to eliminate the risk of falling; and

c) a rescue plan and procedures

"fall risk" means any potential exposure to falling either from, off or into;

"health and safety file" means a file, or other record containing the information in writing

required by these Regulations;
"health and safety plan" means a site, activity or project specific documented plan in accordance with the client's health and safety specification;
"health and safety specification" means a site, activity or project specific document prepared by the client pertaining to all health and safety requirements related to construction work;
"material hoist" means a hoist used to lower or raise material and equipment, excluding passengers;
"**medical certificate of fitness"** means a certificate contemplated in regulation 7(1)(8);
"mobile plant" means any machinery, appliance or other similar device that is able to move independently, and is used for the purpose of performing construction work on a construction site;
"National Building Regulations" means the National Building Regulations made under the National Building Regulations and Building Standards Act, 1977 (Act No. 103 of 1977), and promulgated by Government Notice No. R. 2378 of 30 July 1990, as amended by Government Notices No's R. 432 of 8 March 1991, R. 919 of 30 July 1999 and R. 547 of 30 May 2008;
"person day" means one normal working shift of carrying out construction work by a person on a construction site;
"principal contractor" means an employer appointed by the client to perform construction work;
"Professional Engineer or Professional Certificated Engineer" means a person holding registration as either a Professional Engineer or Professional Certificated Engineer in terms of the Engineering Profession Act, 2000 (Act No. 46 of 2000);
"Professional Technologist" means a person holding registration as a Professional Engineering Technologist in terms of the Engineering Profession Act, 2000;
"provincial director" means the provincial director as defined in regulation 1 of the General Administrative Regulations, 2003;

"scaffold" means a temporary elevated platform and supporting structure used for providing access to and supporting workmen or materials or both;
"shoring" means a system used to support the sides of an excavation and which is intended to prevent the cave-in or the collapse of the sides of an excavation;
"structure" means— a) any building, steel or reinforced concrete structure (not being a building), railway line or siding, bridge, waterworks, reservoir, pipe or pipeline, cable, sewer, sewage works, fixed vessels, road, drainage works, earthworks, dam, wall, mast, tower, tower crane, bulk mixing plant, pylon, surface and underground tanks, earth retaining structure or any structure designed to preserve or alter any natural feature, and any other similar structure; b) any falsework, scaffold or other structure designed or used to provide support or means of access during construction work; or c) any fixed plant in respect of construction work which includes installation, commissioning, decommissioning or dismantling and where any construction work involves a risk of a person falling;

"suspended platform" means a working platform suspended from supports by means of one or more separate ropes from each support;
"temporary works" means any falsework, formwork, support work, scaffold, shoring or other temporary structure designed to provide support or means of access during construction work;
"the Act" means the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993);
"tunneling" means the construction of any tunnel beneath the natural surface of the earth for a purpose other than the searching for or winning of a mineral.

1.3 OBJECTIVE:

As per the **CLIENT** SHE Management Process, a Safety, Health and Environmental Specification will be provided to all potential Contractors intended to be procured for the project.

The objectives of this process are:

- To ensure that Contractors plan for safety, health & environmental aspects prior to establishing on site.
- To ensure that Contractors have the required resources and competencies to carry out the work safely.
- To ensure that Contractors are aware of the SHE requirements on the project over and above the legal requirements.
- To ensure that potential Contractors make provision for the costs relating to the management of SHE during the construction process.
- To evaluate the Contractors status prior to awarding the contract.
- To clarify any uncertainties and concerns up front, rather than on-site.

1.4 SCOPE:

This SHE Specification covers the responsibilities and procedures that the **CLIENT**
procured Contractors has to have in place for the management of SHE related aspects
on this Project.

1.5 COMMERCIAL / CONTRACTUAL ISSUE:

As legislation forms part of any Country's legal system, **CLIENT** Management requires all of its Contractors to fully conform to this legislation as part of the contract. All expenses to the Contractor, which result from conforming to this legislation as well as special requirements specific to the site, will be for the Contractors account.

CLIENT and the Client's Representative reserve the right to stop work whenever SHE violations are observed. The expense of such work stoppage and resulting standing time shall be for the Contractors account.

The requirements within this specification should not be considered to be exhaustive and **CLIENT** or the Client reserves the right to add, delete or modify conditions where it is considered to be appropriate.

No claim will be accepted as a result of any costs or delays being incurred due to the Contractor or his sub-contractors not complying with this SHE specification.

1.6 LANGUAGE:

CLIENT requires of the Contractor that all communications which includes

regulations, instructions, signage etc. pertaining to the work is communicated in a language understood by all persons on site.

2. POLICY

2.1 SHE POLICIES:

2.1.1 CONTRACTOR SHE POLICY:

The Contractor shall have a SHE Policy authorised by their organisation's top management that clearly states overall SHE objectives and commitment to continuously improving safety, health and environmental performance.

3. PLANNING

3.1 PRECEDENCE OF HEALTH AND SAFETY LEGISLATION:

Works on this project is covered by the legislative requirements of the relevant statutory authority of the region in which the works are to take place.

3.1.1 These legislative requirements impose a statutory obligation on all employers, employees, contractors, designers and manufacturers. It is the responsibility of each contractor to ensure that the applicable legislation applies on this project.

3.1.2 Contractors are required to reference the legislation pertaining specifically to the project and ensure that information is readily accessible at all times, by all of their employees and sub contractors on site.

3.1.3 In addition, to the applicable legislation and the client's procedures and standards shall be adopted as minimum requirements. Where there are no provisions within the legislation or standards for any aspect of Construction SHE then the **CLIENT** Construction Managers provisions would be the adopted standard.

3.2 REFERENCES – LEGAL AND OTHER

It is required that all Contractors on site fully comply with all applicable legislation and other requirements as stipulated.

It is the duty of the Contractor to ensure that they are familiar with all the necessary SHE legislation and best practice standards.

3.3 PROJECT DESCRIPTION:

- Installation of a complete solar system
- Building work for an equipment room
- Complete electrical installation in building and site reticulation (Inclusive of the relocation of the generators).
- Wet Works (civil work to be relocate the existing sewerage system).

3.4 CONTRACTORS SHE PLANS:

Procurement staff is responsible to ensure that this SHE Specifications is provided to all potential Contractors with the relevant tender documents.

Contractors are to use the SHE guidelines referred to herein to develop a suitable and sufficient SHE plan that demonstrates compliance to the Project SHE requirements. Contractors' SHE plans will be reviewed and amended in consultation with the Contractors and authorised (re SHEG/015) for use by the **CLIENT** Project Manager and the Client. Contractors will thereafter be required to follow the same procedure when procuring sub-contractors. Contractors will not be allowed to commence work on site until their SHE plan has been approved. Compulsory items within a SHE plan shall include but not necessarily be limited to the following:

- Contractor's SHE Policy
- Proof of compensation injury insurance for all site personnel.
- Statutory and company appointments
- Competency profile of appointed persons
- Risk assessments of hazards identified.
- Safe work procedures
- Financial allocation for SHE.
- High risk machinery, tools & equipment maintenance plan.
- Company experience in related work

3.5 RISK MANAGEMENT:

3.5.1 Risk Assessment

Certain construction activities, equipment, substances etc. represent a significantly higher safety risk than others. The Contractor will be required to analyse his scope of work and define these critical activities. For each critical activity, a risk assessment will be required which lists the various activities and sub activities with the hazard /danger associated with the task, the control measures in place to mitigate the risk and the person responsible for this. All applicable Hazardous Chemical Substances, together with the relevant hazardous data documentation (MSDS), shall form part of the risk assessments. The following normal industrial and health related hazards are associated with, but not limited to, the operation:

- Chemical hazards - associated with handling and construction
- Thermal hazards - hot working environments and adjacent hot processes
- Physical hazards - lifting, carrying, pulling and pushing; repetitive
- Vehicle and mobile equipment - trucks, service vehicle, forklifts, and cranes
- Tools and machinery - maintenance equipment and tools
- High pressure gases - compressed air, acetylene, argon, oxygen
- Workplace hazards - falling (high places), rolling, sliding, slipping
- Noise and vibration - mobile equipment, equipment and process
- Electricity - medium and high voltage supply
- Fire and explosion - fuels and compression
- Stress related - shift work, heat, working environment
- Environmental related - space, heat, waste, ventilation, illumination, amenities
- Health – Malaria, TB, Cholera, Yellow Fever, Hepatitis, HIV/ Aids, Bilharzia. (if applicable)

Should the B-CM or his duly nominated alternative identify hazardous activities performed by the Contractor on the site for which the Contractor has not submitted a risk assessment, the Contractor will be required to do so before continuing the work. The Contractor is therefore required to ensure that the activities are continuously assessed for risks and managed accordingly.

When a risk is rated as high or medium, a safe work procedure has to be developed which will detail the steps to be followed to ensure that the activities / work will be completed safely – risks must be reduces as low as reasonably practical prior to undertaking the activity. An activity may be classified as high or medium by the decision of the B-CM or the B- SHEO or the Client.

The risk assessment and outcomes are to be communicated to all the workers prior to starting work and they should acknowledge / sign that they understand the risk assessment. Thereafter the risk assessment must be discussed as a tool box talk topic at least once a week and providing the activity has not changed.

The Contractor shall ensure that planned task observations are conducted on tasks that pose a significant risk to their employees and verify the risk assessment is still applicable and has not changed. Additional draining needs may also be identified during planned task observation.

A contractor must ensure that as far as is reasonably practicable, ergonomic related hazards are analyzed, evaluated and addressed in a risk assessment.

3.5.2 Risk Assessment Methodology

A risk assessment involves an analysis of an identified potential hazard. Assessing risk involves identifying the most likely consequence that may result from an exposure to the hazard as well as the likelihood of the sequence of events occurring. The initial assessment should not take into account any existing hazard management, control methods, technical systems or safe work procedures. This may lead to overlooking an uncontrolled hazard and should only be considered when applying suitable control measures.

The likelihood of an event occurring and the extent of the potential consequences are assessed and the potential risk given a “Risk Assessment Score” to assist with prioritising hazards for control and monitoring.

In the absence of an acceptable risk assessment methodology, the contractor may use the Risk Assessment Matrix table below. It will be necessary to determine an initial Risk Score, then following the identification of controls to be put into place; an initial Risk Score can be calculated and applied.

Determine the most likely or typical Consequence resulting from exposure to the hazard. This may involve either injury to persons or damage to property or the environment. The next step is to determine the Likelihood phrase which best describes the chance of the event occurring. The Risk Assessment Score is the point on the matrix where Likelihood and Consequence meet.

2. 3.5.3 Risk Assessment Matrix

LIKELIHOOD		CONSEQUENCES				
		1	2	3	4	5
		Low First Aid	Minor Medical Treatment	Moderate LTI	Major Fatality	Catastrophic Multiple Fatalities
A	Almost Certain	16	14	5	3	1
B	Likely	20	15	12	4	2
C	Moderate	21	19	13	11	6
D	Unlikely	23	22	18	10	7

E	**Rare**	**25**	**24**	**17**	**9**	**8**

The outcome of the 'Risk Assessment Score' can then be recorded on the hazard register to prioritise hazards as;

High e.g. 5 A **Moderate** e.g. 3D
Medium e.g. 5 E **Low** e.g. 2E

3.5.4 Hierarchy of Controls

The identified hazards can then be reduced and controlled in order of level of priority using the Hierarchy of Controls priority method as follows:

- **Elimination** of the Hazard
- **Substitution** of the method/s to be used to carry out the task
- **Isolation** of the hazard from the person or the person from the hazard
- **Engineering** - applications to minimise or reduce exposure to the hazard
- **Administration** – develop safe work procedures, method statement, permits, training, signs, supervision
- **PPE** – supply of personal protective equipment such as safety glasses, protective clothing. PPE is listed and used as a last resort method of hazard control.

3.6 ENVIRONMENTAL REQUIREMENTS:

3.6.1 *(CLIENT)* has environmental requirements for contractors and will provide management personnel and support to ensure that adequate care will be taken by the Contractor to prevent pollution of the environment in any way whatsoever.

3.6.2 No oil is to be drained into the ground by the Contractor. Precautions need to be taken to ensure that oil spillages are contained. In the event of oil spillage, clean up kits need to be readily available with appropriate trained personnel from the relevant Contractor.

3.6.3 Contractors are required to separate waste into industrial, hydrocarbon (including rags), and domestic, steel and wood.

3.6.4 The following health and environmental impacts are applicable to this project:

Aspect	Impact	Objective
Air Pollution (Dust, exhaust fumes, gases, etc.)	Potential health risk to workforce and adjoining land users	To protect workforce and adjoining land users
Flora & Fauna	Potential for weed spread or introduction. Destruction of wildlife habitats	To maintain the abundance, diversity, geographic distribution and productivity of vegetation and wildlife.
Noise & Vibration	Potential health risk to employees and adjoining land users	To meet legislative requirements
Waste Management	Inappropriate disposal of solids, liquids, hazardous substances resulting in contamination.	To reduce the amount of waste going into landfill

Hydrocarbons and Chemical Spillage	Soil and water contamination and potential employee health risk	To protect environment and employee health
Heritage & cultural	Damage to cultural sites	To protect cultural sites

3.7 SITE START UP REQUIREMENTS

Prior to starting work Contractors are to:

- Submit the requested documentation as indicated in this SHE Specification, section 3.4, to the **CLIENT** SHE Department for assessment.
- Complete and submit to the **CLIENT** Site Start Up Checklist

4. OPERATIONAL

4.1 ROLES AND RESPONSIBILITIES:

4.1.1 Project Manager (B-PM):

The Project Manager is the responsible person appointed by the BATEMAN. He is responsible for the overall management of the project both on and off-site and as such shall ensure that the necessary resources have been allocated for the management of SHE on the project.

4.1.2 Construction Manager (B-CM):

The Resident Construction Manager is the responsible person appointed in terms of the SA OHS Act 16.2 delegated responsible person. He is responsible for the overall management of the project on-site, which includes the overall SHE management.

4.1.3 Project Engineer (B-EM):

The Engineering Manager is the responsible person appointed in terms of the OHS Act 16.2. He is responsible for the management of the overall design on the project as well as the engineering works on site.

4.1.4 Contractors

The Contractor carries prime responsibility for the safety of all persons (including sub-contractors working for him) within his working area. The B-CM shall approve the Contractor Site Manager and define the working area of the specific Contractor prior commencement of work. None of the additional SHE requirements specified by the B-CM reduces the Contractor's responsibility for SHE within his working area as per the requirements laid down in this specification.

The Contractor is directly responsible for the actions of his sub-Contractors. The Contractor will also be responsible for initiating any remedial action that may be necessary to ensure that the sub-Contractor complies with all the SHE requirements.

The Contractor shall provide any sub-Contractor who is making a bid or appointed to perform construction work, with the relevant sections of the documented SHE specification, who would in turn provide the Contractor with a SHE plan for acceptance.

The Contractor shall stop any work from being executed which is not in accordance with the SHE Specification, their SHE Plan and Procedures, or which poses a threat to the safety and health of persons or the environment.

The Contractor shall ensure that the sub-contractor/s appointed has the necessary competencies and resources to perform the work safely.

In the event that the Contractor has to introduce a new sub contractor for work on the site, the Contractor must first inform the B-CM and obtain his approval. Such sub-contractor must, in every respect, meet the SHE requirements.

4.1.5 Employees

Employees are responsible for their own safety and that of their co-workers in their area in terms of legislation. They must be made aware of their responsibilities during induction and awareness sessions some of which are:

- Familiarising themselves with their workplaces and safety procedures.
- Working in a manner, which does not endanger themselves or others.
- Keeping their work area tidy.
- Reporting all injuries.
- Protecting fellow workers from injury.
- Reporting unsafe acts ("near misses") and incidents.
- Reporting any situation, which may become dangerous.
- Carrying out lawful orders and obeying safety rules.
- Maintaining Health & Environmental requirements

It must be highlighted to all employees, that anyone who becomes aware of any person disregarding a safety notice, instruction or regulation shall immediately indicate this to the person concerned. If he persists the matter must be reported.

Fighting, damage to property and stealing are serious offences on site and summary dismissal may result from this behaviour.

The consumption or possession of alcohol or illegal drugs on site is strictly prohibited

4.2 SUPERVISION & APPOINTMENTS:

4.2.1 The Contractor shall provide adequate levels of suitably trained, experienced and competent management and supervision to ensure that the work proceeds safely and without risks to health or the environment, and that all operations and personnel for whom the Contractor is responsible are adequately monitored and supervised.

4.2.2 Construction Manager Responsibilities shall include, but not be limited to:

- Defining responsibility for maintaining housekeeping standards. (The areas of responsibility are to be clearly shown on a plan of the site area.)
- Defining responsibility for keeping registers up to date and monitoring of those registers to ensure compliance.
- Performing a daily inspection of all work sites against an approved checklist.

- Holding regular scheduled meetings with staff and ensuring that safety job specific toolbox talks are held on a daily basis.

- Ensuring that an alternative responsible person is appointed should he be absent from site.

- Ensuring that the applicable SHE legislation are complied with.

- Ensuring compliance to the requirements of this document.

4.2.3 Contractors are to appoint a full-time CONSTRUCTION HEALTH AND SAFETY OFFICER (in terms of Construction Regulation 8) will be required on this project. The construction Health and safety officer will be required to carry out basic functions of CHSO, as per SACPCMP Requirements. CHSO, should be registered with the SACPCMP. Provide proof of Registration or proof that Application for registration has been done and submitted to SACPCMP.

4.2.4 The contractor may apply for an exemption to clause 4.2.3 in writing to the B-CM on consideration of the man power on site and or the risk associated with the activities being done.

4.2.5 Contractors are to ensure that the appointments listed below are made where applicable. Persons on site may have more than one appointment, provided that such persons are able to adequately and responsibly supervise the works in terms of both their time availability and competency.

- Demolition supervisor
- Excavation supervisor
- Construction vehicles & Mobile plant operators
- Explosives Supervisor
- Lifting machine operators
- Lifting tackle & equipment inspector
- Fall Protection plan co-ordinator
- Formwork Support Work Operations Supervisor
- Risk Assessor
- Scaffolding supervisor
- Scaffold inspector
- Scaffold erectors & dismantlers
- Stacking & Storage supervisor
- Suspended platform load tester
- Suspended platform supervisor
- Riggers for lifts in excess of 5 tons.
- Temporary Electrical Work Installations controller
- Portable electric tool inspector
- Explosive power tool inspector
- Fire Coordinators
- Health & safety Representatives (1 per 50)
- First-aiders (1 per 50)

4.2.6 Records of appointments are to be kept by all Contractors and submitted to

the **CLIENT** SHE Officer.

4.3 MEETINGS & COMMUNICATIONS:

4.3.1 The Contractor shall hold a SHE meeting at least once a week with all appointed supervisors, the appointed SHE officer and the chairperson of the Health and Safety committee. Copies of minutes of these meetings must be forwarded to the B-SHEO.

4.3.2 Apart from the required internal SHE meetings the Contractors' Site Managers, their appointed responsible persons, and where applicable their SHE Officers will also be required to attend the weekly SHE Project Meeting with the B-SHE Manager.

4.3.3 All progress control meetings (**CLIENT** & Contractors) are to have SHE as a first standing item on the agenda and dealt with accordingly.

4.3.4 Each Contractor on site is to submit to the B-SHEO a comprehensive monthly SHE report within the first week of the following month which shall contain at least the following information:

- Manpower on site
- Hours worked for the month and the project to date.
- Brief description of incidents / accidents for the month
- Lost Time Injury Frequency Rate (LTIFR) / man-hours.
- Hours worked without an LTI.
- Environmental incidents
- Occupational diseases
- Appropriate trend graphs of SHE performance with agreed benchmarks
- Inductions completed for the month
- Medicals examination if applicable
- Non-conformances issued or received
- Housekeeping
- Forthcoming hazardous activities
- Training done for the month
- Training programme for the following month.
- General issues

4.3.5 Communication Matrix

SHE issues specific to this project are to be communicated as follows:

Method/Medium	**Frequency**	**Participants**	**Record**
Principal Contractors / Client Kick Off Meeting	On mobilisation to site.	Client Rep / CM / PM / BSHEO	Meeting Record and Minutes
Contractors Kick Off Meeting	On mobilisation to site.	**CLIENT** Mgt Reps, Contractors Mgt Reps, BSHEO	Meeting Record and Minutes
Site Inductions (includes General HSE induction by client and site-specific induction by **CLIENT** and each contractor)	At commencement on site	All personnel	Record of attendance
Risk Assessment	Prior to commencement of activity	All Personnel	Record of attendance

Safe Work Procedure	Prior to commencement of activity	All Personnel	Record of attendance
Pre-Start Meeting/Job Specific Toolbox Talks	Daily	Supervisors / employees / BSHEO	Record of attendance
Generic Tool Box Meeting	Weekly	All personnel	Record of attendance
SHE Management System Review	3 monthly	CM/BSHEO / Supervisors	Review Minutes
Project Site SHE Meeting	Weekly	**CLIENT** Mgt Reps / Subcontract Mgt Reps/BSHEO/ BCM/Contractor Risk manager/Contractor SO	Minutes

Method/Medium	**Frequency**	**Participants**	**Record**
Contractor Health & Safety Committee Meeting	Monthly	BSHEO / Mgt Representative / Employee & Contractors SHE Representative/ Contractor Safety Officer	Minutes
Health & Safety Notice Board	Regular daily review and update of SHE information.	BSHEO or nominated Representative	Displayed prominently
SHE Bulletins	As required	CM/BSHEO / Client / Contractor	Letter drops
Interested Parties	As authorised by Client and **CLIENT** CM	CM/BSHEO / Client / Contractor	Minutes/Reports

4.4 PERSONAL PROTECTIVE EQUIPMENT:

4.4.1 No person is allowed to enter the site without the required PPE. This issue is discussed at the weekly SHE meeting and must be adhered to by all Contractors on site.

4.4.2 Contractors will be required to ensure that their employees wear appropriate protective clothing that clearly distinguishes them from other Contractors on site, (Company name and or Logo will be acceptable).Contractors are expected to ensure that any sub-contractors also comply with this requirement

4.4.3 The Contractor must ensure that PPE is being used as a last resort upon trying all reasonable means to remove the hazard.

4.4.4 All Contractors are required to keep an updated register of all PPE issued.

4.4.5 Strict non-compliance measures must be administered to any employees not complying with the use of PPE.

4.4.6 Safety helmets, safety shoes and protective clothing shall be provided by the Contractor for all his employees and shall be worn at all times, except in the offices. Employees working near live electrical installations shall wear non-metallic helmets. Other protective equipment, such as gloves, safety glasses, goggles, face shields, and ear-protection, shall be issued and used when required. Additional specialised safety equipment may be required for certain activities or areas. The Contractor shall ensure that his employees understand why the personal protective equipment is necessary and that they use and maintain them correctly.

4.4.7 Safety belts are not allowed on site. Only full body safety harnesses with double lanyards are allowed and must be used when conducting work at elevated positions in excess of 2m, except when working on a properly built scaffold platform or when there is no fall hazard present.

4.4.8 Suitable impact resistant eye protection shall always be worn for grinding, chipping and chasing, and screens shall be provided to protect onlookers and passers-by.

4.4.9 Welders, brazers and cutters shall wear suitable eye protection, gloves and apron spats and screens shall be provided to protect onlookers and passers-by.

4.4.10 When handling corrosive liquids, (e.g. acids or caustic), suitable eye protection, gloves and special overalls shall be worn and in accordance with the applicable Material Safety Data Sheets.

4.4.11 Suitable eye protection shall be worn by all persons including visitors, in all areas of the construction site.

4.4.12 Ear protection shall be worn in any designated noise zone.

4.4.13 Suitable respirators, as well as rescue personal and equipment for quick removal of the person from the danger area, shall be provided where gas or oxygen depleted areas could pose a hazard.

Any person refusing to wear protective clothing when instructed to do so by the responsible person shall be removed from the site.

4.5 OCCUPATIONAL HEALTH AND HYGIENE ISSUES:

4.5.1 An adequate number of accessible first aid facilities must be provided by Contractors at all worksites, and this will include equipped first aid boxes.

4.5.2 The Contractor will have one or more qualified first aiders available on site where there are more than 10 persons while work is in progress. An additional qualified first aider should be available for each additional group of 20 employees.

4.5.3 The Contractor will be responsible for the full cost of any medical treatment that his staff may require. It is the responsibility of the Contractor to ensure that all his personnel are medically fit before being allowed onto the work site.

4.5.4 All persons working on the project are to have passed medical fitness, only medicals done within a year from site start date will be allowed. Medicals to be done by a Registered Occupational Medical Practitioner in the form of Annexure 3.

4.5.5 The contractor shall ensure that occupational and workplace hygiene standards

as required by **CLIENT** are met at all facilities used by contract employees.

4.5.6 A full drug and alcohols screen may also be undertaken and passed within the limits specified by the Client.

4.5.7 Sufficient time needs to be allocated for these medicals to be done prior to work commencing on site at costs borne by the Contractor. “Sending unhealthy workers to site will have a disastrous effect on them and the project.”

4.5.8 Evacuation and transportation of Contractor’s employees from site to places of safety and/ or suitable medical facilities must be arranged by the Contractors and be in place should the need arise.

4.5.9 All site office accommodation facilities where required shall be provided in compliance with legal requirements and with the clients prior approval. .

4.5.10 Eating facilities / rest areas for site workers ***to be provided by the contractor*** and no food will be allowed in the actual workplace.

4.5.11 No person will be allowed to sleep, camp, squat or build any other form of accommodation on or near the site.

4.5.12 Water for drinking purposes only shall be provided by the Contractor from sources indicated to the Contractor by the B-CM via the Client.

4.5.13 No equipment or system shall be connected onto the drinking water system without prior approval of the B-CM and the Client.

4.5.14 The Principal Contractor must supply Sufficient toilets (1 toilet per 30 workers), showers (1 for every 15 workers), changing facilities, hand washing facilities, soap, toilet paper, and hand drying material must be provided. Waste bins must be strategically placed and emptied regularly. Safe, clean storage areas must be provided for workers to store personal belongings and personal protective equipment. Workers should not be exposed to hazardous materials/substances while eating and must be provided with sheltered eating areas.

4.6 TRAINING AND AWARENESS:

The Contractor must ensure that all his employees are competent and adequately trained to perform the tasks allocated to them and that there is the required amount of supervision present at all times to maintain safe work practices and standards, particularly where semi-skilled and unskilled personnel are involved. Site supervisors in particular are required to be competent and recent training should include a minimum acceptable Supervisory Safety course.

4.6.1 SHE Induction

SHE induction is to comprise of the following:

4.6.1.1 **Construction Site Specific Induction**

Each Contractor will be required to ensure that before an employee commences work on the site that the Contractor charged with responsibility for the employee has informed the employee of:

- The site rules and regulations associated with the work performed.
- The hazards and controls associated with the work performed.

The Contractor shall maintain comprehensive records of personnel under his control attending induction training, copies of which shall be provided to the B-SHEO upon request. Acknowledge of receiving and understanding the induction

must be signed by all persons attending the induction accordingly.

In addition, Contractors shall provide basic health and safety training, approved by the **CLIENT** Construction Manager, to all unskilled personnel and maintain records of such training.

4.6.1.2 Any person normally working on the site and subsequently away from site for more than three months shall be required to undergo another re induction upon return.

4.6.2 **Tool Box Talks**

4.6.2.1 The Contractor must have a daily safety job specific "tool box" meeting. This will include the discussion of any standard task procedures or hazardous operational procedures to be performed by the employee. The Contractor is to ensure that the supervisor has satisfied himself that the employee is conversant with all hazards associated with any work to be performed.

4.6.2.2 A copy of the risk analysis / items discussed along with signatures of all employees present will be kept on file and submitted to the B-SHEO upon request.

4.6.2.3 The risk assessment must be discussed as a tool box talk topic at least once a week providing the activity has not changed.

4.6.3 **SHE Promotion/ Orientation**

4.6.3.1 To promote a positive SHE culture on site, the Contractor will display SHE slogans, logos, achievements, bulletins and initiate a SHE recognition and incentive programme.

4.6.3.2 The awareness programmes will be updated and varied as the work progresses. The theme will develop as the focus of activity develops i.e. from civil to mechanical etc.

4.6.3.3 A compulsory HIV/ Aids and Health awareness programme shall be established for the project by each Contractor and rolled out accordingly to all the respective workers. Additional information and programs may be undertaken by the Client.

4.7 EMERGENCY PROCEDURE:

The Principal Contractor shall submit a detailed Emergency Procedure for approval by the Client prior to commencement on site. The procedure shall detail the response plan including the following key elements:

- List of key competent personnel;
- Details of emergency services;
- Actions or steps to be taken in the event of the specific types of emergencies;
- Information on hazardous material/situations.

Emergency procedure(s) shall include, but shall not be limited to, fire, spills, accidents to employees, use of hazardous substances, bomb threats, major incidents/accidents, etc. The Principal Contractor shall advise the Client in writing forthwith, of any emergencies, together with a record of action taken. A contact list of all service providers (Fire Department, Ambulance, Police, Medical and Hospital, etc.) must be maintained and available to site personnel.

4.8 DOCUMENTATION CONTROL:

4.8.1 It is realised that proper and effective administration is important for proper execution and control of SHE matters.

4.8.2 It is therefore required on sites that all Contractors keep an up to date SHE filing system which would have all the necessary documentation required for legislative needs as well for proof and control purposes. Some of the elements to be included in the SHE filing system are:

- Safety, Health and Environmental Specification
- Safety, Health and Environmental Plan
- Appointments
- Competency records of appointed persons.
- Site inspection records
- Tool and equipment registers
- Non-conformances records
- Audits results
- Risk assessments
- Incident reports
- Incident investigations
- First aider training
- Health & Safety Representative training
- Induction training
- Load tests results
- SHE meeting minutes
- Electrical connection certificates
- Maintenance schedules & results
- Fall protection plans
- PPE registers
- Toolbox talk registers
- Medical records (confidential)
- Crane lifts riggers studies
- Method statements
- Emergency evacuation plans
- Authorisation information
- Correspondence

4.8.3 The B-SHEO would evaluate all Contractors filing system and provide instructions on improvements or changes.

4.8.4 A complete set of SHE documentation or as indicated by the B-SHEO, which would include the latest “as built” designs and drawings of the project, must be handed to the B- SHEO upon completion of the project.

4.9 ACCESS CONTROL:

4.9.1 The following measures are to be in place:

4.9.1.1 Proper Access control is in place and functional at all times around working areas.

4.9.1.2 Safety Signage to be in place and proper barricading of all working areas.

4.9.1.3 A Traffic plan around the construction area to ensure the safe movement of all construction related mobile plant and with respect to any operational mobile plant.

4.10 HOURS OF WORK:

4.10.1 The hours worked by the contractors and his sub-contractors must comply with the hours as defined in the Basic Conditions of Employment Act regulations, particularly as regards the limit on overtime.

4.10.2 Public holidays and Sunday labour is generally not permitted. Any exceptional application requests to be submitted to the B-CM, in accordance with Client policy and procedures.

4.11 LIQUOR AND DRUGS:

Intoxicating liquor and illicit drugs are not permitted on site, nor will anyone under the influence of either be permitted on site. Any person found on site with these substances or under the influence of these substances will be removed from site. Monitoring facilities will be in operation at Security.

4.12 MACHINERY, TOOLS AND EQUIPMENT:

4.12.1 The Contractor shall ensure that all machinery, tools and equipment are safe to be used and is maintained in a good condition.

4.12.2 No machinery, tool or equipment will be allowed onto the premises that is of a sub-standard nature or poses a threat to the health and safety of persons. All machinery, tools and equipment will be subject to inspection by **CLIENT** prior to bringing onto the site. All defects will be rectified at the Contractor's cost.

4.12.3 All machinery, tools and equipment to be regularly inspected as required by legislation and best practices, registers of which is to be kept on file. Such equipment is to have a tag or similar identification such that it can be properly monitored regarding inspections.

4.12.4 All relevant SHE signage are to be in place as required by legislation, the Client Representative, **CLIENT** and best practices, PPE pictograms and unauthorised entry signs are typical examples.

4.12.5 In addition you are made aware of the following:

- Disembarking from vehicles in motion is prohibited.
- All rotating machinery must be guarded to prevent injury.
- Standing or walking under suspended loads is prohibited.
- Hand tools must be kept in good condition.
- Hammers, chisels and files are to receive particular attention.
- Flash back arresters must be fitted to oxy-acetylene and L.P.G. equipment on both sides i.e. torch side and regulator side.
- No unapproved "site fabricated purpose made tools" will be allowed on site

4.13 HOUSEKEEPING:

4.13.1 The Contractor is required to keep his construction sites tidy and free of debris at all times. Waste must be classified and separated prior to disposal in the waste skips / bins provided by the Client.

4.13.2 Adequate care must be taken by the Contractor to ensure that storage and stacking is correctly and safely carried out. Good housekeeping standards must be maintained throughout the project.

4.13.3 The B-CM reserves the rights to stop all site activities at any stage should he considers that general housekeeping is not to the satisfaction of either the Client and or BATEMAN. Such stoppage and clean up time will not be added to the construction programme and or construed as an extension of time. The B-CM also reserves the right to bring in additional labour to clean up a site at the Contractors cost.

4.14 TRANSPORT AND VEHICLES:

4.14.1 The Contractor must maintain his vehicles in a roadworthy condition and are subject to inspection by the B-SHEO.

4.14.2 All vehicles will be subject to an inspection prior by the client prior to bringing onto site, all defects will be rectified at the Contractor's cost.

4.14.3 All operators of mobile equipment must posses the required licence and competency certificates for the operation of such equipment

4.14.4 The Contractor will provide suitable man carrying vehicles for transportation of the Contractors workforce and staff on and off the site. Safety seat belts shall be worn at all times and headlights shall be switched on and dimmed when travelling inside the site Tipper trucks are not considered suitable for this purpose.

4.14.5 All site LDVs and every mobile machine whose vision is impaired when reversing must have a hooter, which sounds, when the machine is reversing. This covers trucks, cranes, loaders and so forth.

4.14.6 Emergency vehicles operating under emergency conditions have right of way over all vehicles and machinery followed by earthmoving machinery has the right of way at all times. Vehicles must not be parked near earthmoving machines. All speed limits must be obeyed. Keys are not to be left in the vehicles.

4.14.7 All Contractors should be made fully aware of the need for road safety and the penalties that exist for violating the speed limits and other safe driving laws.

4.14.8 General speed restriction of 20 km/h is in operation around construction areas

4.14.9 No parking in the construction area

4.15 ELECTRICAL INSTALLATIONS:

Prior to connection to any electrical supply by the Contractor, all electrical installations must be inspected and tested by an accredited person. A certificate of compliance is required and is part of the approval process by the B-CM or his Representative. Earth leakage protection must be provided for by the Contractor for portable electrical equipment and double insulated equipment is recommended. No electrical switching shall be carried out without prior written approval from the B-CM as an application to the NPA is required.

4.16 WORK IN ELEVATED POSITIONS:

4.16.1 Whenever persons are required to work in an elevated position, every possible and practicable means shall be adopted to provide such persons with effective safeguards.

4.16.2 The Contractors shall stop all persons working on the erection of steelwork during

periods of inclement weather or if the possibility of lightning strikes is present.

4.16.3 Five point safety harnesses with dual lanyards and fall arrest devices will be worn when working at an elevation of 2 metres or more. All Contractors shall comply and have in place a fall protection plan, which includes both fall prevention and arrest equipment and the specific training aspects to ensure a competent workforce

4.16.4 Working on elevated positions shall only be carried out under the supervision of a competent person.

4.16.5 Lifelines are to be used with safety harnesses when doing steel erection and other similar activities such that persons are not exposed to danger by continuously attaching and detaching the lanyards from the structure.

4.16.6 Provision must be made to prevent tools and other objects and/ or material from falling from elevated areas and the protection of persons working below.

4.16.7 When a Contractor's work results in circumstances where a person can fall through or from a floor, working platform etc. he shall erect adequate rigid barriers and, where appropriate, suitable warning signs to prevent person from falling.

4.16.8 All access scaffolding on site shall be designed, erected, inspected prior to use, used and dismantled in accordance with SANS 085 Standards. A red "unsafe for use "and green "safe for use" inspection card system or equivalent is strongly recommended.

4.17 EXCAVATIONS:

4.17.1 Digging or excavation operations by the Contractor may not commence without a permit to work and authorisation from the B-CM.

4.17.2 Adequate precautions shall be taken by the Contractor to prevent slumping of excavations, as well as to prevent rocks and loose material falling onto workers.

4.17.3 All excavations by the Contractor are to be securely barricaded to prevent accidental access during day and night.

4.17.4 Solid barricading to be used at areas where there is a fall hazard present and in conjunction with orange netting and warning signage. Demarcation chevron tape may not be used for barricading excavations.

4.17.5 All excavations work is to be conducted in accordance with the applicable codes of practices.

4.18 PLANT AND MACHINERY

4.18.1. Construction Plant

"Construction Plant" includes all types of plant including but not limited to, cranes, piling rigs, excavators, road vehicles, and all lifting equipment.

The Principal Contractor shall ensure that all such plant complies with the requirements of the OHS Act 85/1993 and Construction Regulations 2014. The Principal Contractor and all relevant Sub Contractors shall inspect and keep records of inspections of the construction plant used on site. Only authorised/competent persons are to use machinery under proper supervision. Appropriate PPE and clothing must be provided and maintained in good condition at all times. Proofs of medical test as required by the Construction regulations 2014 are available for inspection by the Client.

Vehicles shall not enter site with:

* Defective exhaust systems
* Serious oil or fuel leaks
* Unsafe bodywork or loads
* Non-standard equipment fitted.
* Improperly seated passengers
* Any obvious mechanical defects.

All earth moving equipment shall be operated in accordance with good safety practice so as to protect the safety of the operator and other workers or persons in the area. All earth moving equipment shall be equipped with a reverse siren

4.18.2 Vessels under Pressure (VuP) and Gas Bottles

The Principal Contractor and all relevant Sub Contractors shall comply with the Vessels under Pressure Regulations, including:

1. Providing competency and awareness training to the operators;

2. Providing PPE or clothing;

3. Inspect equipment regularly and keep records of inspections;

4. Providing appropriate firefighting equipment (Fire Extinguishers) on hand.

4.18.3. Fire Extinguishers and Fire Fighting Equipment

The Principal Contractor and relevant Sub Contractors shall provide adequate, regularly serviced firefighting equipment located at strategic points on site, specific to the classes of fire likely to occur. The appropriate notices and signs must be posted up as required. A Fire risk survey must be conducted by a competent person; proof of survey must be kept in the Site Safety File.

4.18.4 Hired Plant and Machinery

The Principal Contractor shall ensure that any hired plant and machinery used on site is safe for use. The necessary requirements as stipulated by the OHS Act 85/1993 and Construction Regulations 2014 shall apply. The Principal Contractor shall ensure that operators hired with machinery are competent and that certificates are kept on site in the health and safety file. All relevant Sub Contractors must ensure the same.

4.18.5. Scaffolding / Working at Heights

Working at heights includes any work that takes place in an elevated position. The Principal Contractor must submit a risk-specific fall prevention plan in accordance with the Construction Regulations 2014 before this work is undertaken. The Client must approve the fall prevention plan before work may commence.

4.18.6. Temporary work

The Principal Contractor shall ensure that the provisions of section 12 of the Construction Regulations 2014 are adhered to. These provisions must include but not be limited to ensuring that all equipment used is examined for suitability before use; that all formwork and support work is inspected by a competent person immediately before, during and after placement of concrete or any other imposed load and thereafter on a daily basis until the formwork and support work has been removed. Records of all inspections must be kept in a register on site.

4.18.7. Lifting Machines and Tackle

The Principal Contractor and all Contractors shall ensure that lifting machinery and tackle is inspected before use and thereafter in accordance with the Driven Machinery Regulations and the Construction Regulations (section 22). There must be competent lifting machinery and tackle inspector who must inspect the equipment daily or before use, taking into account that:

1. All lifting machinery and tackle has a safe working load clearly indicated
2. Regular inspection and servicing is carried out;
3. Records are kept of inspections and of service certificates;
4. There is proper supervision in terms of guiding the loads that includes a trained banks man to direct lifting operations and check lifting tackle;
5. The tower crane bases have been approved by an engineer;
6. The operators are competent as well as physically and psychologically fit to work and in possession of a medical certificate of fitness to be available on site.

4.18.8. Ladders and Ladder Work

The Principal Contractor shall ensure that all ladders are inspected monthly, are in good safe working order, are the correct height for the task, extend at least 1m above the landing, fastened and secured, and at a safe angle. Records of inspections must be kept in a register on site. Sub-Contractors using their own ladders must ensure the same. Ladders shall not be used as horizontal walkways or as scaffolding. Tools or equipment must be carried in suitable slung containers or hoisted up to the working position.

4.19 Public and Site Visitor Health and Safety

The Principal Contractor shall ensure that every person working on or visiting the site, as well as the public in general, shall be made aware of the dangers likely to arise from site activities, including the precautions to be taken to avoid or minimise those dangers. Appropriate health and safety notices and signs shall be posted up, but shall not be the only measure taken.

Both the Client and the Principal Contractor have a duty in terms of the OHS Act 85/1993 to do all that is reasonably practicable to prevent members of the public and site visitors from being affected by the construction activities.

Site visitors must be briefed on the hazards and risks they may be exposed to and what measures are in place or should be taken to control these hazards and risks. A record of these „induction" must be kept on site in accordance with the Construction Regulations.

4.20 Night Work

The Principal Contractor must ensure that adequate lighting is provided to allow for work to be carried out safely.

5. CHECKING & CORRECTING

5.1 NON –CONFORMANCES & RECTIFICATION:

5.1.1 The B-CM and the B-SHEO and the Client has the authority to issue a non-conformance notice to any Contractor not complying to the SHE requirements on the site, with the necessary required rectification action required within a specific time

frame.

5.1.2 It should be noted by the Contractors that any expenses incurred due to non-conformances shall be for the Contractor's account in question.

5.1.3 Any person has the authority to stop work if there is a life threatening situation and/or the danger of substantial material loss/damage and direct suggested remedial action through to the supervisor of the Contractor's and/or the Contractor Site Manager as required.

5.1.4 Any "stop work order" and non-conformance shall be followed up and the Contractor's Site Manager shall present a written report including remedial actions to avoid re-occurrence and the subject shall be discussed at the next SHE Meeting.

5.1.5 The B-CM, after consultation with the Contractor's Site Manager, has the authority to initiate disciplinary action for contravening SHE regulations and, if considered necessary, to instruct the Contractor's Site Manager to remove certain of his employees or himself from the site.

5.2 INSPECTIONS:

5.2.1 Inspections as required by legislation, the client and the BCM/BSHEM, must be conducted by competent persons and records kept thereof.

5.2.2 All non-conformances revealed during the inspections are to be noted and rectified as soon as possible.

5.2.3 All Contractors' Site Managers are to carry out a daily inspection of the area in which they are working in order that the work area can be declared safe to begin work. Such declaration must be in writing, signed off on daily basis and handed in to the B-CM before commencing with any work every morning.

5.2.4 Supervisors are required to inspect all areas within their scope of work on a **daily** basis and take any corrective action immediately in order to maintain their area in a hazard free condition. This shall include but not limited to:

- On site leadership
- Risk Assessments completed and communicated
- Toolbox talks relative to the task
- Equipment safety
- Safe work procedures and method statements

5.3 ACCIDENT AND INCIDENT REPORTING:

5.3.1 The Contractor shall keep a record of all injuries sustained on the project and report all such injuries immediately to the B-CM or the B-SHEO who in turn would report it to the Client's Representative and **CLIENT** Project Manager within 24hrs.

5.3.2 In addition to injuries required to be reported by law, the following incidents are also to be reported immediately.

- All reportable incidents as required by legislation and including flying or fracturing objects, machinery out of control, dangerous substance spilled uncontrolled release of substance under pressure etc.
- All lost time and first aid cases
- Any "near-miss" situation.

- Any occupational disease.
- Any damage caused to property or the environment.

All off-site incidents reporting to any Government Authorities shall be coordinated through the Client.

5.3.3 Any incident involving medical treatment shall have the Workers Compensation forms completed by the employee along with a first medical certificate completed by the Occupational Health practitioner. Each Subcontractor Company shall ensure that all injured personnel receive ***prompt medical assistance and rehabilitation*** with a prompt return to work without jeopardising the employee's early recovery. The recovery process shall be monitored and recorded by the Contractor on a regular basis and at least weekly.

5.3.4 All reporting of incidents/accidents and near misses is encouraged to pick up trends that could lead to a lost-time injury.

"It has been shown that when first aid cases and near miss situations occur and go unnoticed or no corrective action results, larger ones appear which makes it potentially easy for a major lost-time injury to occur."

5.4 ACCIDENT/ INCIDENT INVESTIGATION:

5.4.1 All incidents as stipulated in clause 5.3.2 shall be investigated. A preliminary report and recorded in the agreed upon format shall be provided by the Contractor within 24hrs from the time of occurrence.

5.4.2 The Contractor shall submit the "Final Investigation" report to the B-SHEO no later than 3 working days, or sooner, from the time of occurrence.

5.4.3 The B-SHEO shall be involved in the investigation process for fairness, transparency and to maintain an objective approach.

5.4.4 The Contractor Site Manager must ensure that the preventative/ corrective and/or contingency plans recommended in the investigation report are within the quickest time reasonably possible.

5.4.5 The activities may not continue until reasonable agreed upon remedial measures are in place to prevent a reoccurrence of the incident

5.5 AUDITS

5.5.1 The following SHE audits, in accordance with the agreed protocol, shall be executed on the project:

- Contractor's monthly audit on sub-contractors.
- Contractor's self audit / assessment
- **CLIENT** Safety Agent initial Assessment 3 to 4 weeks after start up
- **CLIENT** Site Monthly audit on Contractors

3. MANAGEMENT REVIEW

6.1 SHE REVIEW

The B-SHEO in collaboration with the B-CM, and the Head Office SHE Manager shall review the **CLIENT** SHE Management Plan and the Contractors SHE Plans on an ongoing basis to continually improve on the SHE performance. A close out report shall be compiled in conjunction with the site B-CM and the B-SHEO

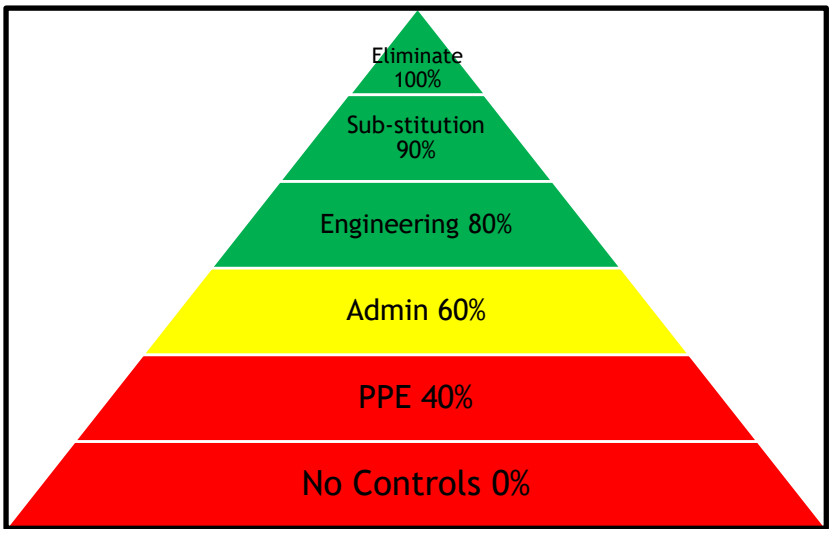
6.2 CONTRACTOR SHE REVIEW

The Contractor in collaboration with the B-CM, and the **CLIENT** Head Office SHE Manager shall review the Contractors SHE Management Plan and the sub-contractors SHE Plans on an ongoing basis to continually improve on the SHE performance.

ANNEXURE

CLIENT BASELINE RISK ASSESSMENTS

EFFECTIVENESS OF CONTROLS:



CONTROLS (EXAMPLES ONLY)		
ENGINEERING	**ADMINISTRATIVE**	**PPE**
• Local exhaust ventilation • General ventilation • Silencer on machine • Installed lighting • Barricading • Bunding • Access control cages • Automated lockout • Filter bags • Drip tray • Machine fixed guard • Earth leakage • Automated braking system • Wet scrubber • Sound proofing • Closed water reticulation • Drainage/water channels • Automated access control • Filtration system • Speed limiter • Reconditioning • Product reuse in process • Ligt curtain • Methane/ energy capture	• Inspections • Culture survey • Posters • Demarcation • Symbolic signage • Colour coding • Waste permits • Monitoring programme • Labelling • Lock out • Performance tests • MSDS • Vehicle licence • Certificate of compliance • Toolbox talks/awareness • Training • Appointments • Emergency plan • Mock drill • Internal or external audits • Incident recall • HSE committee meeting • Supervision • Medical surveillance • Man-job specification • Work instructions • Planned job observation • Waste management • All documentation	• Hard hat • Goggles • Safety harness • Boots • Face shield • Gauntlets • Boot flap • Gloves • Lead apron • Ear protection • Hazchem suit

BASELINE RISK MATRIX	HAZARD EFFECT / CONSEQUENCE				
LOSS TYPE	**1 INSIGNIFICANT**	**2 MI**	**3 MODERATE**	**4 MAJOR**	**5 CATASTROPHIC**
Timeline	No impact on overall project timeline	in overall project timeline overrun of less than 5%	result in overall project timeline overrun of between 5% and less than 20%	result in overall project timeline overrun of between 20% and less than 50%	result in overall project timeline overrun of 50% or more
Budget	No impact on the budget of the project	result in overall project budget overrun of less than 5%	result in overall project budget overrun of between 5% and less than 20%	result in overall project budget overrun of between 20% and less than 50%	result in overall project budget overrun of 50% or more
Investment Return – NPV loss	Less than R5m	to less than R50m	to less than R500m	R500m to R5b	R5b or more
Quality	No impact on quality	Minimal quality issues that can be addressed in a short timeframe with minimal interactions	quality issues that requires immediate management action	Significant quality issues that requires senior project management interaction	Significant quality issues that requires sponsorship intervention with significant resource and cost implications for rework

Safety / Health	aid case / Exposure to minor health	treatment case / Exposure to major health risk	time injury / Reversible impact on health	fatality or loss of quality of life / Irreversible impact on health	Multiple fatalities / Impact on health ultimately fatal
Environment	Minimal environmental harm – L1 incident	Material environmental harm – L2 incident remediable short term	Serious environmental harm – L2 incident remediable within LOM	environmental harm – L2 incident remediable post LOM	Extreme environmental harm – L3 incident irreversible
Legal regulatory	No legal impact	Minor legal concerns with minor impact	legal concerns with manageable level of impact	Serious legal concerns and significant impact on operation	non-compliance with risk of shutdown of operations with significant cost impacts
Reputation / Social / Community	impact - public awareness may exist but no public concern	Limited impact - local public concern	Considerable impact - regional public concern	National impact - national public concern	International impact - international public attention

LIKELIHOOD		RISK RATING				
5 Almost Certain	The unwanted event has occurred frequently; has a 90% and higher probability of reoccurring	**11 Medium**	**16 Significant**	**20 Significant**	**23 High**	**25 High**
4 Likely	The unwanted event has a probability of between 60% and less than 90% of occurring	**7 Medium**	**12 Medium**	**17 Significant**	**21 High**	**24 High**
3 Possible	The unwanted event has a probability of between 30% and less than 60% of occurring	**4 Low**	**8 Medium**	**13 Significant**	**18 Significant**	**22 High**
2 Unlikely	The unwanted event has a probability of between 1% and less than 30% of occurring	**2 Low**	**5 Low**	**9 Medium**	**14 Significant**	**19 Significant**
1 Rare	The unwanted event has never occurred, has a probability of less than 1% of occurring	**1 Low**	**3 Low**	**6 Medium**	**10 Medium**	**15 Significant**

BASELINE RISK ASSESSMENT

NO	HAZARD/ITEM	RISK ASSOCIATED WITH HAZARD	CONSEQUENCES	C	L	RR	HOW IS HAZARD TO BE DEALT WITH	BY WHOM	BY WHEN?
1.	**SECTION 1 : SITE ESTABLISHMENT**								
1.1	- **INCOMPETENT PERSONS** - **INCORRECT STACKING** - **PROCEDURES** **DURING SITE ESTABLISHMENT**	• Injuries during off loading • Cuts and burns • Rushed activities • Incorrect supervision • Trip and fall • Cuts • Collapsing of stacks	• Hand and back injuries • Dropping of equipment • Physical injuries • Lost Time injuries • Medical treatment cases • Potentially fatal accidents • Loss of limbs	2	2	6	• The contractor must declare all employees competent in writing • Contractor OHS file must be approved prior to site establishment begins • Site specific safe work procedures must be followed • Site –induction must be given to all employees to make them aware of the specific hazards • Employees must be issued with correct PPE before work begin • All workers on site must be declared medically fit by a medical practitioner	- Construction supervisor - Contractor Safety Officer - CHSA (Construction Health & Safety Agent) - Construction Manager - Construction supervisor	During site establishment
1.2	**OFFLOADING HEAVY EQUIPMENT AND CONTAINERS** **P/C SITE ESTABLISHMENT**	• Defective mobile crane can cause accidents • Adverse weather conditions • Untrained personnel/ Operators • Unsafe hooking methods unstable load	• Serious injury and fatalities • Damage to property and equipment • Potential hand & foot injuries • Standing time	3	4	19	• Material to be stacked on firm and level ground. • Stacking to be supervised by a competent supervisor. • Adequate storage area to be provided • All unstable stacks to be dismantle and stacked over • Load test certificate will be submitted to the client. • Rope certificates must be submitted to the client. • Safe load indicator must be in good working order. • Over wind device must be in place and in working order. • Daily checks as per checklist by operator. • Checklist signed by supervisor and filed by safety officer.	- Construction Supervisor - CHSO - Construction Manager	During site establishment
1.3	**SITE SECURITY AND FENCING**	• Theft of property • Fires • Unsafe conduct or access by visitors/or public	• Financial losses • Loss of equipment / documentation • Stolen goods/material	2	2	5	• Fence with lockable gates • 24 Hour Security deployed • Fire prevention • All required OHS signage	- Construction Manager	

NO	HAZARD/ITEM	RISK ASSOCIATED WITH HAZARD	CONSEQUENCES	C	L	RR	HOW IS HAZARD TO BE DEALT WITH	BY WHOM	BY WHEN?
1.4	**HOUSEKEEPING:** - ABLUTION FACILITIES - CLEAN DRINKING WATER - SHELTERED EATING AREA - DESIGNATED PARKING AREAS - BUNT AREA FOR DIESEL - STORAGE / OFFICE FACILITIES - DESIGNATED STACKING AREAS	• Poor health and diseases • Unsafe movement of people and equipment on site • Personal injuries • Trip & fall incidents • No proper stacking & storage – lead to trip & fall	• Diseases • Serious injuries • Environmental impact • Personal injuries • Lost time injuries • Medical treatment cases • Uncontrolled traffic management could lead to accidents	2	2	3	• Use site establishment checklist to ensure compliance with all items • Designated stacking area to be identified • Laydown area • Parking area for vehicles • Correct signage	- Construction Supervisor - Construction Manager - Housekeeping Supervisor - Stacking & Storage Supervisor	
1.5	**TEMPORARY ELECTRICAL SUPPLY**	• Incorrect installation • Electrocution • Damaged services • Unstable positioning Electrical box	• Medical treatment cases • Fatality due to electrocution • Lost time injuries	4	4	21	• Ensure all cables are marked properly and isolated • Electrician to provide C.O.C for temporary installation • Lock-out/Isolation • Qualified Electrician	- Construction Supervisor - Contractor Safety Officer - Electrical Engineer	At all times
2	**THEFT/SECURITY**	• Unauthorised removal of tools, equipment or substances • Theft of equipment & material	• Financial losses to the company. • Tools, equipment or substances which may be used by inexperienced or incompetent persons could result in injury or ill health to such persons.	4	3	18	• All tools, equipment or substances will be stored in a safe and secure manner. • Security staff will conduct searches of premises and persons in a random basis. • Relevant records will be kept. • Access controls to premises will be maintained.	- Construction Supervisor - CHSO - Security (24 Hr) to be arranged	At all times
3	**LABOUR CONTROL**	• Sub-standard time keeping and attendance records • Poor record keeping • Disputes due to poor labour practices	• Persons remaining on site after the official end of shift time could be injured • Legal disputes and strikes • Standing time due to strikes • Financial losses due to strike action	4	4	20	• Attendance registers are kept at the main offices. • Records of overtime • Sign all company policies with labourers • Proper induction of workforce • Ensure labour contracts signed with all labourers • Signed copies of labour contracts are kept on file in the site office	- CLO - Contractor	Before work commence

NO	HAZARD/ITEM	RISK ASSOCIATED WITH HAZARD	CONSEQUENCES	C	L	RR	HOW IS HAZARD TO BE DEALT WITH	BY WHOM	BY WHEN?
4	**ENVIRONMENT:** - WATER POLLUTION - AIR POLLUTION	• Hazardous substances from the construction process entering rivers, streams or dams • Waste substances from workshops, repair bays or salvage/scrap site • Dust from construction work • Gases and fumes released into the atmosphere	• Contamination of rivers, streams or dams which could result in illness to persons who may consume the water • Contamination of ground water resulting in possible illness to persons • Contaminated water entering rivers or streams • Persons exposed to harmful dust which could result in respiratory illness • Persons exposed to gases and fumes • Damage to structures through corrosion	2	2	9	• Biological monitoring programmes • Regular environmental surveys are conducted • Fumes and gas emission controls at discharge points, i.e. filler system. • Regular environmental survey.	- Construction Supervisor - Construction Health & Safety Officer	Before works commences

NO	HAZARD/ITEM	• RISK ASSOCIATED WITH HAZARD	• CONSEQUENCES	C	L	RR	• HOW IS HAZARD TO BE DEALT WITH	- BY WHOM	BY WHEN?
5	**TEMPORARY STOCKPILING OF MATERIAL (WASTE MANAGEMENT)**	• Stacker's working area always to be kept clean and tidy. Floor area to be free from obstacles • Stacker to stay away from all moving parts of machinery • Un-barricaded area could lead to unauthorised access	• Injury to hand, feet, legs and arms • Lost time injuries • Medical treatment cases • Crushed fingers; Splinters in fingers or hands • Cut to fingers or hands, feet or legs injured • Injury to hands, arms, legs and feet • Injury to all parts of body	2	2	8	• Stackers to be inducted into the use maintenance and reason for wearing PPE • The following PPE is to be used: - Overalls - Safety boots - Gloves - Hard hat - Earplugs(if required) • Units are to be stacked according to a set standard the stack is to be stable and secure before strapping operation may begin • Strapping is also to be done to pre-planned set standard • Be aware of forklift movement when it comes to collect the load • Stackers are to be trained how to stack properly and in a safe way • Stackers are to be trained how to strap properly • Forklift driver to alert stacker that is entering his working area • Stacker to be inducted at his work place. Re: housekeeping and safety • Stacker to be inducted to stay away from the composite plant and moving machinery	- Construction Supervisor - Construction Health & Safety Officer - Hand tools Inspector - Stacking and Storage Supervisor	All the time

NO	HAZARD/ITEM	RISK ASSOCIATED WITH HAZARD	CONSEQUENCES	C	L	RR	HOW IS HAZARD TO BE DEALT WITH	BY WHOM	BY WHEN?
6	**FIRE**	• Lightning • Burning of refuse on site • Unsafe electrical connections could lead to fire hazards • Uncontrolled Hot Works/ Sparks lead to ignition source	• Damage to property or equipment • Destruction of vegetation and possible damage to property or equipment • Injury to persons who enter the area • Environmental pollution	4	3	17	• Fire breaks around structures and buildings • Fill excavations with top soil when full • Maintain perimeter fence and fire breaks • Access gates to be locked • Removal of potential fire hazard sources	- Fire Control Officer - Construction Supervisor - CHSO	At all times
6.1	**FIRES IN STORES**	• Spontaneous combustion caused when chemicals such as HTH and oil products come into contact with each other • Accumulation of vapours/fumes in confined spaces • Accidental ignition during vehicle refuelling. • Ignition of flammable substances due to smoking or naked flames. (i.e. grease/oil, paint, etc.) • Ignition of compressed gas • Ignition of items such as timber, cotton waste, etc. • Ignition due to faulty electrical cables/fittings	• Fires or explosions which could result in damage to property and injury to person • Lost time injuries • Potential for ignition due to naked flames or smoking • Fatalities • Medical treatment cases • Fire or explosion resulting in injury and damage to property • Injury to persons or damage to property or serious injury to personnel • Damage to property	4	3	17	• Conform to the manufacturer's safe handling and storage instructions • MSDS for all combustible materials (chemicals) • Ensure storage area is well ventilated • Display relevant symbolic signs • Adequate fire extinguishers placed in strategic positions. • Warning signs informing persons of danger. • Stored in approval storage areas, i.e. flammable stores • Fire hydrants are required at strategic points • Electrical cables and fitting must not be secured to timber roof beams/ structures i.e. use steel brackets	- Fire Control Officer - Construction Supervisor - Hazardous Chemical Supervisor	At all times

NO	HAZARD/ITEM	RISK ASSOCIATED WITH HAZARD	CONSEQUENCES	C	L	RR	HOW IS HAZARD TO BE DEALT WITH	BY WHOM	BY WHEN?
2	**SECTION 2: BUILDING WORK**								
1	**ROOF WORK (WORKING AT HEIGHTS)** -	• Inadequate preparedness for type of equipment could lead to serious injuries and fatality. • Use of incorrect equipment could cause falls, falling objects • Defective equipment could lead to collapsing structures • Fragile surfaces • Overloading can lead to ropes; slings snapping and cause damage & injury to personnel	• Fatality major disabling injuries • Standing/Lost Time Injuries • Failure to establish safe system for work could lead to fatalities & serious disabling injuries • 1st Aid Medical Treatment cases	4	3	18	• SWL for steel beams to be inspected • Inspect slings; chains; pulleys and hooks • Inspect if overhead power lines • Barricade working area • Qualified operator • No workers under suspended load	- Site Supervisor - Team members - Safety Rep - Working at heights Supervisor - Fall Protection Plan Developer - Construction Supervisor	Before and During task
2	**ELECTRICAL INSTALLATIONS** - External main power supply	• Falling from ladder, back injuries • Hand injuries • Dust particles falling from roof, • Eye damage. • Damage to cable if not done properly. • Electrocution • Falling of lights, damage to property / assets • Fire from incompetent electrician when misconnecting cables etc.	• LTI • 1st Aid Cases / Medical treatment • Serious injuries from falling • Back injuries from falling • Possibility of budget overrun on project • May result in project time overrun	4	3	17	• Ensure power is off and isolated. • All workers must wear PPE to prevent injuries • Trained and qualified electrician to complete task • Proper supervision from Supervisor • Toolbox Talks to be conducted on electrical tasks. • Always have a Fire Extinguisher at job task • All tools and equipment must be inspected. • Fire extinguishers must be available and serviced • Proper supervision must be applied from Supervisor • Correct tools and equipment must be used. • All workers must wear correct and sufficient PPE as required. • Toolbox Talk on Power tools • Ensure Electricity is isolated and locked out / switched off.	- Site Supervisor - Safety Rep - Team - Competent Electrician - Electrical Engineer	Before and During task

NO	HAZARD/ITEM	RISK ASSOCIATED WITH HAZARD	CONSEQUENCES	C	L	RR	HOW IS HAZARD TO BE DEALT WITH	BY WHOM	BY WHEN?
3	**FIRE PROTECTION** - Fire Extinguishers	• Inadequate and wrongly placed fire equipment can cause delay in dealing with fire should it occur. • Poor housekeeping • Falling of objects • Hand injuries • Back injuries • Strains • Non availability of fire equipment's • Untrained personnel using wrong type of equipment to extinguish the fire delays in searching for fire extinguisher. • Fire alarm not functional or inaudible • Access blocked and people trapped inside, firefighting team not able to obtain access. • Shortage or non-operation of firefighting equipment. • Overcrowding at exit point during fire.	• LTI • Medical Cases / 1st Aid Cases. • May result in overall project overrun • Trip slip and falls. • Serious injuries or possible fatalities when fire gets out of control. • Damage to property • Medical treatment • Bruises, cuts, broken limb. • 1st aid case treatment • Loss of life	3	3	13	• Adequate fire equipment to be provided and placed at suitable location • Monthly checklist of all fire equipment's. • Provide training and have fire drills periodically. • Store material in demarcated areas. • Cigarettes to be extinguished properly and thrown into rubbish bins. • Ashtrays and waste bins to be emptied daily. • Fire escape routes and assembly points to be determined and clearly marked. • All workers must use appropriate PPE, • Close supervision • Discuss risk assessment with workers. • Induction training. • Toolbox talks training.	- Construction Supervisor - Foreman - Fir fighting Team - First Aider - Fire prevention supervisor	Before and During task
4	**RETAINING STRUCTURES**	• Falling objects • Unstable surfaces • Unplanned activities • Incorrect work procedure • Collapsing structures	• Lost time injuries • Medical treatment cases • Collapsing structures leading to standing time	4	3	18	• Proper instruction • Engineer design • Proper supervision • Correct tools for the task • Correct PPE • All workers to be inducted on PPE	- Construction Supervisor - Construction Manager	At all times

NO	HAZARD/ITEM	RISK ASSOCIATED WITH HAZARD	CONSEQUENCES	C	L	RR	HOW IS HAZARD TO BE DEALT WITH	BY WHOM	BY WHEN?
5.1	**Ergonomics**	• Repetition movements resulting in MSD's	• Lost time injury • Medical treatment cases • Body Injuries • Project time and budget overrun.	4	3	17	• Train employees in recognizing MSD symptoms. • Encourage early reporting of MSD symptoms. • Re-evaluates work procedures. • Ensure regular resting periods.	- Site Supervisor - Safety Officer - Safety Rep - Team	Before and During task
5.2		• Grip force with hands, wrists, arms resulting in muscle fatigue and inflammation of the muscles and tendons	• Lost time injury • Medical treatment cases • Body Injuries • Project time and budget overrun	4	3	17	• Employees must rest regularly. • Re-evaluates work procedures and workflow	- Site Supervisor - Safety Officer - Safety Rep - Team	Before and During task
5.3		• Lift/Lower force activities that could result in lower back injuries	• Lost time injury • Medical treatment cases • Body Injuries • Project time and budget overrun	4	3	17	• Employees need proper training in lifting practices. • Job task observations to ensure adequate employees to complete tasks. • Mechanical lifting where possible should be encouraged. • Packaging and type of material to be used can also be redesigned.	- Site Supervisor - Safety Officer - Safety Rep - Team	Before and During task
5.4		• Working in awkward positions this squatting, kneeling and sitting resulting in fatigue and the effects associated with overuse of muscles, joints and tendons	• Lost time injury • Medical treatment cases • Body Injuries • Project time and budget overrun	4	3	18	• Adequate resting brakes should be allowed. • Continuous job tasks analyst should be conducted. • Redesigning of the task should be investigated. • Employees are encouraged to report when any discomfort is experienced.	- Site Supervisor - Safety Officer - Safety Rep - Team	Before and During task
5.5		• Extreme temperatures that could also lead to heat exhaustion	• Lost time injury • Medical treatment cases • Body Injuries • Project time and budget overrun	4	3	17	• Trained first aider with knowledge of heat exhaustion should always be on site. • Sufficient fresh water must be taken every hour (600ml). • Where possible proper bush hats to be issued to protect employees from direct sunlight. • Sunscreen should also be available.	- Site Supervisor - Safety Officer - Safety Rep - Team	Before and During task

NO	HAZARD/ITEM	RISK ASSOCIATED WITH HAZARD	CONSEQUENCES	C	L	RR	HOW IS HAZARD TO BE DEALT WITH	BY WHOM	BY WHEN?
5.6	**Ergonomics (continue)**	• Activities that result in hand-arm vibration (HAV) and whole – body vibration (WBV) that could result in MSD and white finger syndrome	• Lost time injury • Medical treatment cases • Body Injuries • Project time and budget overrun	4	3	17	• Equipment with the lowest vibration factor should be used where possible. • Work procedures where vibrating equipment are excluded should be preferred. • Proper maintenance schedules must be in place. This must include seating in mobile plant. • Proper medical surveillance program should be in place. • Employees must have proper training in the use of vibrating equipment. • Where hand held vibrating equipment is used vibrating reducing hand gloves must be issued.	- Site Supervisor - Safety Officer - Safety Rep - Team	Before and During task

C3.6 STANDARD MINIMUM REQUIREMENTS

In terms of section 5(2) of the Construction Industry Development Board Act, 2000 (Act no. 38 of 2000) (the Act), the Construction Industry Development Board is empowered to establish and promote best practice standards, Standard Requirements and Guidelines which includes the following but not limited to:

C3.61 cidb Best Practice: Green Building Certification, No. 34158 Government Gazette, 1 April 2011

C3.6.2 cidb Standard for Developing Skills through Infrastructure Contracts, No. 36760 Government Gazette, 23 August 2013

C3.6.3 cidb Standard for Indirect Targeting for Enterprise Development through Construction Works Contracts, No 36190 Government Gazette, 25 February 2013

C3.6.4 Preferential Procurement Policy Framework Act, 2000: Preferential Procurement Regulations, 2017, No. 40553 Government Gazette, 20 January 2017

C3.6.5 cidb Standard for Contract Participation Goals for Targeting Enterprises and Labour through Construction Works Contracts, No. 41237 Government Gazette,10 November 2017

C3.6.6 cidb Standard for Minimum Requirements for Engaging Contractors and Sub-Contractors on Construction Works Contracts, No. 41237 Government Gazette, 10 November 2017

C3.6.7 cidb Standard for Minimum Requirements for Engaging Contractors and Sub- Contractors on Construction Works Contracts, No. 42021 Government Gazette, 9 November 2018

C3.6.8 cidb Standard for Developing Skills through Infrastructure Contracts, No 48491 Government Gazette, 23 April 2023

C3.7 CONTRACT PARTICIPATION GOALS AND CIDB BUILD PROGRAMME

Provision has been made within the Contract Participation Goal section in the Bill of Quantities for the respective CPGs. Prescribed Profit and Attendance percentages have been stipulated, all inclusive of associated costs to the contractor for implementation and allowance for submitting reports to the Employer's Representative on a monthly basis in terms of monthly and accumulative targets achieved with audited supporting documentation.

Monthly progressive reports to be submitted to the Employer's representative indicating the percentage targets achieved which must be reconciled upon completion of the project and to form part of the final account.

The contractor shall achieve in the performance of this contract the following Contract Participation Goals (CPGs) as indicated below:

C3.7.1 Minimum Targeted Local Material Manufacturer Contract Participation Goal

The Minimum Targeted Local Building Material Manufacturers CPG is "not applicable" to this project.

It is the requirement of the employer that the contractor enhances the use of local Small, Micro and Medium Enterprise Local Material Manufacturers (SMME's) in executing this contract, irrespective whether a minimum percentage Participation Goals is applicable or not.

The Minimum Targeted Local Manufacturers of Material Contract Participation Goal, in accordance with the cidb Standard for Contract Participation Goals for Targeting Enterprises and Labour through Construction Works Contracts as published in the Government Gazette Notice No. 41237 of 10 November 2017, as amended in cidb Best Practice Project Assessment Scheme Notice No. 43726 of 18 September 2020.

A Targeted Local Material Manufacturer is a targeted enterprise that operates or maintains a factory or establishment that produces on its premises materials or goods required by the principal contractor for the performance of the contract.
Note: Adapted from SANS 10845-7:2015, definition 2.13

Preference shall be given to the Targeted Local Material Manufacturer where feasible in **insert applicable Ward/s, Municipal District, Town, City, Province**, and provided that:

(a) Such materials comply in all respects with the specific requirements of PW371 and SANS specifications,
(b) The non-availability of such materials shall not adversely affect the desired progress of the specific works,
(c) The use of such suppliers shall not constitute grounds for any claim for increased cost in respect thereof,
(d) Materials of at least **insert applicable percentage, both in words and figures** of the total value of materials purchased excluding VAT to be sourced from within **insert applicable kilometerskm** radius of the project site,
(e) Material of at least **insert applicable percentage, both in words and figures** of the total value of materials purchased excluding VAT to be sourced from within **insert applicable kilometerskm** radius of the project site.

Failure to achieve the minimum specified value as indicated in the CPG Bill of Quantity Section for Targeted Local Material Manufacturer participation will result in a **thirty percent (30%**) penalty of the prorate targeted value of materials not complied with unless the contractor can prove to the Employer's satisfaction that the non-achievement was beyond his/her control.

The contractor shall submit monthly reports in terms of monthly achievement and accumulative targets achieved including audited supporting documentation to the Employer's Representative.

C3.7.2 Minimum Targeted-Local Building Material Suppliers Contract Participation Goal

The Minimum Targeted Local Building Material Suppliers CPG is "not applicable" to this project.

It is the requirement of the employer that the contractor enhances the use of local Small, Micro and Medium Enterprise Local Material Suppliers (SMME's) in executing this contract, irrespective whether a minimum percentage Participation Goals is applicable or not.

The Minimum Targeted Local Manufacturers of Material Contract Participation Goal shall be achieved in accordance with the cidb Standard for Contract Participation Goals for Targeting Enterprises and Labour through Construction Works Contracts as published in the Government Gazette Notice No. 41237 of 10 November 2017, as amended in cidb Best Practice Project Assessment Scheme Notice No. 43726 of 18 September 2020 – Condition of Contract.

A targeted supplier is a targeted enterprise that
a) owns, operates or maintains a store, warehouse or other establishment in which goods are bought, kept in stock and regularly sold to wholesalers, retailers or the public in the usual course of business; and
b) engages, as its principal business and in its own name, in the purchase and sale of goods.
Note: Adapted from SANS 10845-7:2015, definition 2.14

Preference shall be given to the local material suppliers where feasible in the **insert applicable Ward/s, Municipal District, Town, City, Province**, and provided that:

(a) Such materials comply in all respects with the specific requirements of PW371 and SANS specifications,
(b) The nonavailability of such materials shall not adversely affect the desired progress of the specific works,
(c) The use of such suppliers shall not constitute grounds for any claim for increased cost in respect thereof,
(d) Materials of at least **insert applicable percentage, both in words and figures** of the total value of materials purchased excluding VAT to be sourced from within **insert applicable kilometerskm** of the project site,

(e) Material of at least **insert applicable percentage, both in words and figures** of the total value of materials purchased excluding VAT to be sourced from within **insert applicable kilometerskm** of the project site.

Failure to achieve the minimum specified value as indicated in the CPG Bill of Quantity Section for Targeted Local Material Manufacturer participation will result in a **thirty percent (30%)** penalty of the prorate targeted value of materials not complied with, unless the contractor can prove to the Employer's satisfaction that the non-achievement was beyond his/her control.

The bidder shall submit monthly reports in terms of monthly achievement and accumulative targets achieved including audited supporting documentation to the Employer's Representative.

C3.7.3 Minimum Targeted Local Labour Skills Development Contract Participation Goal

The Minimum Targeted Local Labour Skills Development CPG is "not applicable" to this project.

It is the requirement of the employer that the contractor enhances the use of local labour in executing this contract. This is required to be done through the use of both traditional building techniques and labour-intensive construction techniques careful and considered construction planning and implemented in the project irrespective whether a minimum percentage Participation Goal is applicable or not.

The Minimum Targeted Local Skills Development Contract Participation Goal shall be achieved in accordance with the cidb Standard for Contract Participation Goals for Targeting Enterprises and Labour through Construction Works Contracts as published in the Government Gazette Notice No. No. 48491 of 28 April 2023 and the cidb Best Practice Project Assessment Scheme Notice No. 43726 of 18 September 2020 – Condition of Contract..

Targeted labour: individuals who:

a) are employed by the principal contractor, sub-contractor or targeted enterprises in the performance of the contract;
b) are defined as the target group in the targeting data; and
c) permanently reside in the target area or who are recognized as being residents of the target area on the basis of identification and association with and recognition by the residents of the target area.

Adapted from SANS 10845-7:2015, definition 2.12

Targeting of labour by skills categories is only permissible within categories of semi-skilled and unskilled labour.

Contract participation goals for semi-skilled and unskilled labour shall be limited to on-the-job training to targeted labour to enable such labour to master the basic work techniques required to undertake the work in accordance with the requirements of the contract and in a manner that does not compromise worker health and safety. In the case of targeted labour, the certification of records shall be in accordance with SANS 10845-8.

Beneficiaries will be sourced from the **insert applicable Ward/s, Municipal District, Town, City, Province** for the full duration of the Construction Period, employed by either the principal contractor, sub-contractors or targeted enterprises. The total number of working days to complete the Works amount to **insert number of working days as determined by the Construction Period** working days. The minimum CPG participation for Targeted Local Labour Skills Development is **insert applicable percentage, both in words and figures**, expressed as a percentage of the total number of working days required to complete the Works. The contractor shall attain or exceed the CPG in the performance of the contract. Failure to achieve the minimum Targeted Local Labour Skills Development CPG will result in a payment reduction of **R5 000** (Excluding VAT), per working day which training has not been provided to the workforce in attendance, unless the contractor can prove to the Employer's satisfaction that the non-achievement was beyond his/her control.

The bidder shall submit monthly reports in terms of monthly achievement and accumulative targets achieved including audited supporting documentation to the Employer's Representative.

C3.7.4 CIDB BUILD PROGRAMME: Minimum Targeted Enterprise Development Contract Participation Goal

The Minimum Targeted Enterprise Development CPG is "not applicable" to this project.

The aim of this best practice standard for indirect targeting for enterprise development in accordance with the Standard for Indirect Targeting for Enterprise Development (published in Government Gazette 36190 of 25 February 2013), as amended in cidb Best Practice Project Assessment Scheme Notice No. 43726 of 18 September 2020 – Condition of Contract. is to promote enterprise development by providing for a minimum Contract Participation Goal (CPG) of ***insert percentage Min 5% and Max 30%*** of the contract amount as defined in the Standard (Tender amount, excluding allowances and VAT) on selected contracts to be undertaken by joint-venture partners or to be sub-contracted to developing contractors that are also to be beneficiaries of enterprise development support from the main contractor.

The bidder shall submit monthly reports in terms of monthly achievement and accumulative targets achieved including audited supporting documentation to the Employer's Representative.

The lead partner or main contractor shall dedicate a **minimum *insert percentage Min 5% and Max 30%*** of the tender value at the time of award, excluding allowances and VAT, to provide developmental support to targeted subcontractor or joint venture partner applicable to contracts in Grades 7 to 9, General Building and Civil Engineering contracts. Preference will be given to insert type of enterprises, e.g. General Building, Electrical, Mechanical, Plumbing, etc. .It could be either or any combination of all Enterprises.

Failing to achieve the targeted Contract Skills Development Goal will result in A) a thirty percent (30%) penalty of the value of the portion not achieved, excluding VAT, and B) the issuing of completion certificates only after the completion certificate of achieving the skills development goal, counter-signed by the relevant individuals has been submitted, unless the contractor can prove to the Employer's satisfaction that the non-achievement was beyond his/her control.

The bidder shall submit monthly reports in terms of monthly achievement and accumulative targets achieved including audited supporting documentation to the Employer's Representative.

C3.7.4.1 Criteria

The main or lead partner of the successful bidder shall:

(a) There must be a needs analysis for indirect targeting and development or skill standard and should be development in at least any two developmental areas namely;

- Administrative and cost control systems
- construction management systems and plans
- planning, tendering and programming
- business; technical; procurement skills
- legal compliance
- credit rating/history; financial loan capacity/history
- contractual knowledge

(b) The above needs analysis shall be mutually agreed upon between contractor and targeted enterprise

(c) The contractor shall appoint an enterprise development coordinator to:

- perform needs analysis on the targeted enterprise to identify developmental goals
- develop a project specific enterprise development plan to improve the targeted enterprise/s performance in the identified developmental areas
- provide internal mentorship support to improve the targeted enterprise/s performance
- monitor and submit to the employer's representative a monthly enterprise development report thereby reporting on the progress of the agreed development areas with the targeted enterprise/s

- submit a project completion report to the Employer's representative for each targeted enterprise.

C3.7.4.2 Management

The contractor shall provide a competent person/s to provide internal mentorship to the Targeted Enterprise/s in the two agreed developmental areas.

C3.7.4.3 Competence Criteria for an Enterprise Development Co-ordinator

The enterprise development co-ordinator shall have the following competencies:

- Minimum experience of 5 years in the construction industry at Managerial level as a Site Agent, Contracts Manager, Site Manager, Construction Manager, Business Development Manager or Enterprise Development Manager.
- Minimum experience of 2 years in training and development in Building or Construction; and
- National Diploma or B Degree in the Built Environment or Business Management

C3.7.4.4 Format of Communications

The contractor shall submit to the Employer's Representative:

- *Project interim reports* in the specified format **(ED105P)** detailing interim values of the CPG that was achieved together with an assessment of the enterprise development support provided should be tabled and discussed at least monthly at progress meetings between employer's representative and the contractor;
- *Project completion report* in the specified format **(ED101P)** to the Employer's Representative for acceptance within 15 days of achieving practical completion. The report shall include the value of the CPG that was certified in accordance with the contract, cidb registration numbers of each and every targeted enterprise, and the value of the subcontracted works or of the joint venture entered into; and the participation parameter
- *Enterprise development declaration (**ED104P**).*

C3.7.4.5 The Key Personal

The contractor shall appoint an Enterprise Development Co-ordinator and a competent person/s to provide internal mentorship.

C3.7.4.6 Management Meetings

The contractor shall report to the Employer's Representative on the implementation and progress of the targeted enterprise development and CPG at monthly progress site meetings.

C3.7.4.7 Forms for contract administration

The contractor shall submit to the Employer's Representative the following proformas:

- Form ED 105P Project Interim Report
- Form ED 104P Enterprise Development Declaration
- Form ED 101P Project Completion Report

C3.7.4.8 Records

The contractor shall:

- keep records of the targeted enterprise development
- keep records of the payments made to the targeted enterprises in relation to the CPG.
- ensure all the documentation required in terms of the Standard is provided with each monthly progress payment certificate and according to a prescribed format where applicable.

C3.7.4.9 Payment Certificates

The contractor shall:

- achieve the measurable CPG and providing enterprise development support to the targeted enterprise/s as per the Standard.
- submit payment certificates to the Employer Representative at intervals determined in the Contract.

C3.7.4.10 Compliance requirements

Non-compliance with the Best Practice Project Assessment Scheme

The wording of regulation 27A of the cidb regulations makes provision for the Board to enforce the cidb code of conduct in the event of clients being found to be in breach of the best practice project assessment scheme.

- Not including the requirements of the cidb standards in the conditions of tender
- Not registering the award of contract on the cidb Register of Projects (RoP)
- Not reporting practical completion on the cidb Register of Projects (RoP)

3.7.5 **CIDB BUILD PROGRAMME: Minimum Targeted Contract Skills Development Goal (CSDG)**

The Minimum Targeted Contract Skills Development CPG is *"not applicable"* to this project.

The contractor shall achieve or exceed in the performance of the contract the Contract Skills Development Goal (CSDG) established in the Standard for Developing Skills through Infrastructure Contracts (published in Government Gazette No 48491 of 23 April 2023 and the cidb Best Practice Project Assessment Scheme Notice No. 43726 of 18 September 2020 – Condition of Contract.

Failing to achieve the targeted Contract Skills Development Goal will result in A) a **thirty percent (30%)** penalty of the value of the portion not achieved, excluding VAT, and B) the issuing of completion certificates only after the completion certificate of achieving the skills development goal, counter-signed by the relevant individuals has been submitted, unless the contractor can prove to the Employer's satisfaction that the non-achievement was beyond his/her control.

The contractor shall apportion the learners in the different construction activities based on the scope of work. The cost of accommodating learners will be determined by using Table 3 in the Standard and this cost will be used to determine the value in Rand and will be added to the provision for training as provided for in the Preliminary and General section in the Bill of Quantities/Pricing schedules/Activity schedule.

C3.7.5.1 Methodology

The contractor shall achieve the measurable contract skills development goal by providing opportunities to learners requiring structured workplace learning using one or a combination of any of the following in relation to work directly related to the contract or order:

Method 1: structured workplace learning opportunities for learners towards the attainment of a part or a full occupational qualification;

Method 2: structured workplace learning opportunities for apprentices or other artisan learners towards the attainment of a trade qualification leading to a listed trade (GG No. 35625, 31 August 2012) subject to at least sixty percent (60%) of the artisan learners being holders of public TVET college qualifications;

Method 3: work integrated learning opportunities for University of Technology or Comprehensive University students completing their national diplomas;

Method 4: structured workplace learning opportunities for candidates towards registration in a professional category by a statutory council.

The contract skills participation goals, expressed in Rand, shall not be less than the contract amount multiplied by a percentage (%) factor given in Table 1 in the Standard for the applicable class of construction works.

Table 1: Contracting skills development goals for different classes of engineering and construction works contracts

Class of construction works as identified in terms of Regulation 25 (3) of the Construction Industry Regulations 2004		**Construction skills development goal (CSDG) (%)**
Designation	**Description**	
CE	Civil Engineering	0.25
CE and GB	Civil engineering and General Building	0.375
EE	Electrical Engineering works (buildings)	0.25
EP	Electrical Engineering works (infrastructure)	0.25
GB	General Building	0.5
ME	Mechanical Engineering works	0.25
SB	Specialist	0.25

The contractor shall apportion the learners in the different construction activities based on the scope of work. The cost of accommodating learners will be determined by using Table 2 in the Standard and this cost will be used to determine the value in Rand and will be added to the provision for training as provided for in the Preliminary and General section in the Bill of Quantities/Pricing schedules/Activity schedule.

Table 2: Notional Cost of Training per Headcount

Source: cidb Standard for Skills Development

Type of Training Opportunity	**Provision for stipends (Unemployed learners only)**	**Provisions for mentorship**	**Provisions for additional costs***	**Total costs**	
				Unemployed learners	**Employed learners**
Method 1					
Occupational qualification	**R7 000**	**R0**	**R9 000**	**R16 000**	**R9 000**
Method 2					
TVET College graduates	**R14 000**	**R0**	**R9 000**	**R23 000**	**N/A**
Apprenticeship	**R14 000**	**R0**	**R12 000**	**R26 000**	**R12 000**
Method 3					
P1 and P2 learners	**R24 000**	**R20 000**	**R4 500**	**R48 500**	**N/A**
Method 4					
Candidates with a 3 year diploma	**R37 000**	**R20 000**	**R4 500**	**R61 500**	**R20 000**
Candidates with 4 year qualification	**R47 000**	**R20 000**	**R4 500**	**R71 500**	**R20 000**

Note: the required CPG will be recalculated based on the awarded tender amount and "Contract amount" once the beneficiaries have been appointed and actual costs are known. The notional cost of providing training opportunities will increase by CPI on an annual basis based on April CPI. Should the rates increase after bid award or during construction the rates will be adjusted as a remeasuarble item.

(a) (a) The successful contractor may employ part/full, trade qualification learners, work integrated learners or candidates directly or through a Skills Development Agency (SDA), (A1 - List of cidb accredited SDAs).

(b) The successful contractor must employ at least sixty percent (60%) of the learners from an FET / TVET college should the contractor select to have part/full occupational qualification learners and trade qualification learners contributing to the CSDG.

(c) The successful contractor shall employ at least **10% (ten percent**) from eligible part/full occupational qualification learners, trade qualification learners, work integrated learners or candidates in the employment of the employer.

(d) The successful contractor shall ensure that no single method shall contribute more than seventy five percent (75%) of the CSDG for the contract.

(e) The successful contractor may only place thirty three percent (33%) employed employees or that of his subcontractors contributing to the CSDG.

(f) The contractor shall employ at least sixty percent (60%) of the learners from a Public FET / TVET college should the contractor select to have trade qualification learners (Method 2) contributing to the CSDG.

(g) One of the objectives of the project is to train **12 (twelve)** Occupational qualifications, trade qualification, work integrated learners – P1 and P2 learners, professional candidates.

C3.7.5.2 Management

(a) The successful contractor must keep site records regarding the' trade qualification learners', work integrated learners' or candidates' (delete that which is not applicable) progress, site attendance, hours worked and other relevant information as required by the Standard.

(b) The successful contractor shall provide the required number of appropriately qualified mentors to the maximum number of part/full occupational qualification learners, trade qualification learners, work integrated learners in the proportion as specified in the Standard.

(c) The successful contractor shall provide a supervisor to manage the training of the part/full occupational qualification learners, trade qualification learners, work integrated learners, candidates.

(d) The successful contractor shall submit to the employer's representative a baseline training plan in the specified format (Pro-forma A2) for the trade qualification learners, work integrated learners, candidates within 30 days of start of the contract.

(e) The successful contractor shall submit to the employer's representative project interim report in the specified format (Pro-forma A3) on the progress of each of trade qualification learner, work integrated learner, candidate three months.

(f) The successful contractor shall submit to the employer's representative the names and particulars in the specified format (Pro-forma A4) of the supervisor, mentors for the trade qualification learners, work integrated learners or candidates within 30 days of start of the contract.

(g) The successful contractor shall keep a daily record of all the part/full occupational qualification learners, trade qualification learners, work integrated learners, candidates on site and their daily activities and shall be made available to the employer's representative on request.

(h) The successful contractor shall submit to the employer's representative the reports on the progress and status of the trade qualification learners, work integrated learners or candidates with the monthly invoice for the payment certificate.

(i) The successful contractor shall have health and safety inductions for all trade qualification learners, work integrated learners or candidates.

(j) The successful contractor shall conduct entry and exit medical tests of all trade qualification learners, work integrated learners or candidates.

(k) The successful contractor shall provide personal protective equipment (PPE) to all trade qualification learners, work integrated learners or candidates at the start of their employment on site.

(l) Based on the agreed skills methods the contractor may employ Trade Qualification Learners and/or Work Integrated Learners and/or Candidates directly or through a Skills Development

Agency (SDA), training provider or skills development facilitator (Form A1 - List of cidb accredited SDAs). The contractor shall ensure that no more than one Method shall be applied to any individual concurrently in the calculation of the CSDG for the contract.

C3.7.6 NATIONAL YOUTH SERVICE TRAINING AND DEVELOPMENT PROGRAMME (NYS)
The National Youth Service Training and Development Programme is *"applicable"* to this project.

The programme shall be implemented in terms of the Implementation of the National Youth Service Programme under the Expanded Public Works (EPWP) and shall be priced in the CPG section of the Bills of Quantities. Monthly reports are to be submitted to the Employer's Representative.

Failure by the contractors to achieve the specified number to be trained in the NYS section of the CPG section within the Bills of quantities will result in a payment reduction as per bill of quantities per person, excluding VAT unless the contractor can prove to the Employer's satisfaction that the non-achievement was beyond his/her control.

C3.7.7 LABOUR-INTENSIVE WORKS

Labour Intensive Works is *"applicable"* to this project.

Where labour intensive work is specified in the Bill of Qualities and indicated by "LI" the contractor must price for and include in rates. Contractors are expected to use their initiative to identify additional activities that can be done labour-intensively to comply with the set minimum labour intensity target. Allowance must be made for submitting monthly reports illustrating the value of the works executed under Labour Intensive Works.

Failure by the contractor to achieve the specified value of the Labour Intensive Participation Goal as stipulated within the Bills of Quantities will result in a **thirty percent (30%)** penalty of the value of the works not done by means of labour intensive methods, excluding VAT, unless the contractor can prove to the Employer's satisfaction that the non-achievement was beyond his/her control.

Employer's objectives:
The employer's objectives are to deliver public infrastructure using labour-intensive methods in accordance with EPWP Guidelines.

Labour-intensive works:
Labour-intensive works shall be constructed/maintained using local workers who are temporarily employed in terms of the scope of work.

Labour-intensive competencies of supervisory and management staff:
Contractors shall only engage supervisory and management staff in labour-intensive works that have completed the skills programme including Foremen/ Supervisors at NQF level 4 "National Certificate: Supervision of Civil Engineering Construction Processes" and Site Agent/ Manager at NQF level 5 "Manage Labour-Intensive Construction Processes" or equivalent QCTO qualifications (See Appendix C) at NQF outlined in Table 1

C3.8 Submission of Accrual Reports

The Contractor shall submit accrual reports to the client representative at the end of March and September each year for the duration of the Service Contract period from the date of appointment up to and including project closeout. This is to ensure that PMTE complies with the accounting framework GRAP, which requires that PMTE disclose all its accruals as at the end of each reporting date.

C.3.9 Submission of Monthly Local Material Utilisation Report (Local Content)

Submission of Monthly Local Material Utilisation Report (Local Content) is *"applicable"* to this project.

The contractors shall be responsible for record keeping, documenting and submission of monthly local material utilization report with supporting documentation to the Employer's representative within 7 working days of the beginning of the successive month, in terms of DTI&C designated

industry/sector/sub-sector schedule as per the PA36 and Annexures C attached to the tender document. The final percentage achievement to be reconciled upon completion of the project and form part of the final account.

Failure by the contractors to achieve the specified percentage of local content per designated industry/sector/sub-sector as listed will result in a thirty percent thirty percent (30%) penalty of the value not achieved, excluding VAT, unless the contractor can prove to the Employer's satisfaction that the non-achievement was beyond his/her control. Allowance must be made for submitting monthly reports illustrating the value of local material utilisation report.

C4 SITE INFORMATION

public works & infrastructure
Department:
Public Works and Infrastructure
REPUBLIC OF SOUTH AFRICA

PG-03.1 (EC) SITE INFORMATION – GCC 3rd Edition (2015)

Project title:	**PAFURI LAND PORT OF ENTRY (LPOE): SUPPLY AND INSTALLATION OF SOLAR PANEL AND WASTE WATER FACILITY**				
Tender no:	H23/022AI	**WCS no:**	WCS052476	**Reference no**:	H23/022AI

C4 Site Information

1. The site is the Pafuri Land Port of Entry situated 35km from the Pafuri Gate (Kruger National Park).

   The site is located within the Kruger National Park and will require specific access arrangements and no accommodation inside the park will be allowed.

2. The site is in a Malaria risk area.

3. Daily temperatures above 30˚ average are experienced in summer.

4. No electricity is available to contractors.

5. Soil conditions are generally “soft rock” and “pickable soil”.

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DRAWING REGISTER

Architectural Services

NO.	DESCRIPTION	DRAWING NO.
1	Drawing Register	AS10492/00/A3
2	Architectural: Energy storage & equipment room - Position and site information	10492/01/A7
3	Architectural: Energy storage & equipment room - Floor plans, sections, and details	10492/02/A7
4	Architectural: Energy storage & equipment room - Floor plans, elevations, and details	10492/03/A7

Architectural and Electrical Engineering Services

NO.	DESCRIPTION	DRAWING NO.
1	Drawing Register	10492/00/A6
2	Architectural: Energy storage & equipment room - Position and site information	10492/01/A7
3	Architectural: Energy storage & equipment room - Floor plans, sections, and details	10492/02/A7
4	Architectural: Energy storage & equipment room - Floor plans, elevations, and details	10492/03/A7
5	Electrical: Site plan - Existing electrical reticulation	EE10492/01-01/A2
6	Electrical: Site plan - Alterations to existing electrical reticulation	EE10492/01-02/A6
7	Electrical: Site plan - Solar array site lv cable reticulation	EE10492/01-03/A5
8	Electrical: Site plan - Solar array site security light layout	EE10492/01-04/A5
9	Electrical: Energy storage & equipment room - Electrical installation	EE10492/100-01/A5
10	Electrical: Energy storage & equipment room - Equipment layout	Omitted
11	Electrical: Schematic diagrams	EE10492/200-01/A4
12	Electrical: Site plan - 3m High inner security fence	EE10492/250-01/A5
13	Electrical: Site plan - 3m High dangerous game fence	EE10492/250-02/A4
14	Electrical: 3m High inner security fence & gate 1 detail - Sheet 1	EE10492/250-03/A2
15	Electrical: 3m High inner security fence & gate 2 detail - Sheet 2	EE10492/250-04/A2
16	Electrical: 3m High inner security fence & gate construction details	EE10492/250-05/A2
17	Electrical: 3m High dangerous game fence construction details	EE10492/250-06/A2

Mechanical Engineering Services

NO.	DESCRIPTION	DRAWING NO.
1	Drawing Register	ME10492/00/A3
2	Mechanical: Energy storage & equipment room - Ventilation details	ME10492/ACV/01/A6
3	Fire: Energy storage & equipment room - Fire signage & protection	ME10492/FPE/01/A3

Structural Engineering Works

NO.	DESCRIPTION	DRAWING NO.
1	Drawing Register	S10492/600/1/A3
2	Foundation Layout	S10492/600/2/A2
3	Foundation Details & Sections	S10492/600/3/A3
4	Structure Type A & B Details	S10492/600/4/A2
5	Structure Type C & D Details	S10492/600/5/A2
6	Structure Type E & F Details	S10492/600/6/A2
7	Structure Type G Details	S10492/600/7/A3
8	Energy storage & equipment room: Roof slab & beams Foundation layout & sections	S10492/600/8/A3
9	Energy storage & equipment room: Roof slab & beams Reinforcing layout	S10492/600/9/A2
10	Array 1 & 2 Longitudinal Section	S10492/600/10/A1
11	Array 3 & 4 Longitudinal Section	S10492/600/11/A1
12	Array 5 & 6 Longitudinal Section	S10492/600/12/A1
13	Array 7 & 8 Longitudinal Section	S10492/600/13/A1
14	Array 9 & 10 Longitudinal Section	S10492/600/14/A1
15	Array 13 Longitudinal Section	S10492/600/15/A2
16	Typical roof layout & Typical Elevation – Arrays Details	S10492/600/16/A1
17	Structures A – G Positioning Layout	S10492/600/17/A3
18	Energy storage & equipment room: Array 11 & 12 Structure layout & Details	S10492/600/18/A2
19	Structure Type H Details	S10492/600/19/A2
20	Array 14 Longitudinal Section	S10492/600/20/A1
21	Array 15 & 16 Longitudinal Section	S10492/600/21/A1

Civil Engineering Services

NO.	DESCRIPTION	DRAWING NO.
1	List of drawings	C1546-00
2	General site plan sheet 1 of 2	C1546-01
3	General site plan sheet 2 of 2	C1546-02
4	Water layout	C1546-03
5	Water layout	C1546-04
6	Sewer layout	C1546-05
7	Sewer longitudinal section sheet 1	C1546-06
8	Sewer longitudinal section sheet 2	C1546-07
9	Sewer details sheet 1	C1546-08
10	Sewer details sheet 2	C1546-09
11	Package treatment plant and signal house	C1546-10