THEMBALETHU SANITATION PROJECT

CONTRACT SCMU 002/2023/2024 (RE TENDER)

CONSTRUCTION OF CIVIL WORKS FOR THE UPGRADING OF THE MKUZE WASTEWATER TREATMENT WORKS AT MKUZE

SCOPE OF WORK

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1. PART 1: CIVIL SCOPE OF WORK

1.1 STANDARDISED SPECIFICATIONS

The standard specifications on which this contract is based are Standards South Africa's Standardized Specifications for Civil Engineering Construction SABS 1200.

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:

AA	1986	:	GENERAL
AB	1986	:	ENGINEER'S OFFICE
C	1980	:	SITE CLEARANCE (As amended 1982)
DA	1988	:	EARTHWORKS (Small Works)
DB	1989	:	EARTHWORKS (Pipe trenches)
DK	1984	:	GABIONS AND PITCHING
DM	1981		EARTHWORKS (Roads and Subgrade)
GA	1982	:	CONCRETE (Small Works)
HA	1990	:	STRUCTURAL STEELWORKS
HC	1988	:	CORROSION PROTECTION FOR STRUCTURAL STEELWORKS
LD	1982		SEWERS
LE	1982	:	STORMWATER DRAINAGE
M	1996	:	ROADS (General)

The following SANS specifications are also referred to in this document and the Contractor is advised to obtain them from Standards South Africa (a division of SABS) in Pretoria.

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 Occupied by the Contractor.

1.2 PROJECT SPECIFICATIONS

The project specification is covered in the following sections:

ITEM	DESCRIPTION
	STATUS
	PROJECT SPECIFICATION PORTION 1: GENERAL
PS-1	Project Description
PS-2	Extent of the Works
PS-3	Description of the Site and Access
PS-4	Nature of Ground and Subsoil Conditions
PS-5	Construction and Management Requirements
PS-6	Construction Programme
PS-7	Site Facilities Available
PS-8	Site Facilities Required
PS-9	Existing Services
PS-10	Requirements for Accommodation of Traffic
PS-11	Occupational Health and Safety
PS-12	Adverse Weather Conditions
PS-13	Site Meetings & Reporting
PS-14	Preferential Procurement
	PROJECT SPECIFICATION PORTION 2
PSA	General
PSD	Earthworks
PSDB	Earthworks (Pipe Trenches)
PSG/PSGA	Concrete (Small Works)
PSLB	Bedding (Pipes)
PSLD	Sewers
PSLE	Stormwater Drainage
	PARTICULAR SPECIFICATIONS
PA	Brickwork and Plaster
PB	Carpentry, Joinery and Ironmongery
PC	Painting
PSP	Steel Pipes
PD	Valves
PE	The Client’s Pre-Construction and Health Plan
PES	Environmental Specification

STATUS

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

Part 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 Standardized or 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.

PROJECT SPECIFICATION: PORTION 1

SABS 1200 PS: GENERAL

PS-1 PROJECT DESCRIPTION

PS-1.1 Employer's Objective

The Umkhanyakude District Municipality as Water Services Authority (WSA) and Water Service Provider (WSP) is responsible for the provision of adequate and reliable potable water and sanitation services to the communities within the Entire Umkhanyakude Region. Umkhanyakude DM has prioritised work to be undertaken in Mkuze to further its mandate, including work on the Thembalethu Sanitation Project.

Through the Integrated Development Plan, Water and Sanitation Backlog Analysis, Sanitation Master Plan and budget process, Umkhanyakude District Municipality has prioritised a number of sanitation projects to eradicate sanitation backlogs and improve health and hygiene standards of the communities under its area of jurisdiction.

As part of achieving its objectives of providing improved sanitation to its communities, Umkhanyakude District Municipality has sought Municipal Infrastructure Grant (MIG) for eradication of sanitation challenges and backlogs within the town of Mkuze.

The Employer's objective is to deliver public water and sanitation infrastructure using labour intensive methods in accordance with the EPWP requirements.

PS-1.2 Overview of the Works

The Thembalethu Sanitation Project is being implemented in phases as funding becomes available. Under this Contract SCMU 002/2023/2024, Umkhanyakude District Municipality intends to construct civil works to upgrade the Mkuze Wastewater Treatment Works from a maturation ponds system to a biological nutrient removal (BNR) system. Simultaneously with this contract, the complimentary mechanical and electrical works has been advertised as follows:

Contract No.	Description
SCMU 016/2022/2023	Supply, Installation and Commissioning of Electro-Mechanical Equipment for the 3.4Ml/d Biological Nutrient Removal Upgrade of the Mkuze Wastewater Treatment Works

PS-2 EXTENT OF THE WORKS

Under this contract, the contractor is required to undertake the civil scope of works as follows:

- Construction of reinforced concrete inlet works
- Construction of 2No. x 1 830m^3 reinforced bioreactors
- Construction of 2No. x 1 150m^3 reinforced concrete clarifiers
- Construction of control building, sewage pumpstation buildings and chlorine contact building.
- Construction of 14 No. x m long x m wide sludge drying beds
- Construction of approximately 2km long gravel access roads to Mkuze Wastewater Treatment Works and to the various structures;
- Pipeline trench excavation works, bedding, laying, backfilling and pressure testing for the following:
    - Up to 355mm diameter uPVC rising gravity and rising pipelines
    - Up to 300mm diameter uPVC sewer lines complete with associated manholes

- Construction of splitter boxes, meter chambers and headwalls
- Cleaning of existing maturation ponds including carting of solid waste and dumping at the Mkuze waste disposal site or the sludge dryings as directed by the Engineer on site
- Emptying of VIP toilet pits at Thembalethu Township and sealing off of the pits in consultation with property owners and the Employer.
- Rehabilitation of areas affected by construction activities
- Cleaning and clearing of the site upon completion of construction work and demobilisation
- Construction of other ancillary works \

PS-3 DESCRIPTION OF THE SITE AND ACCESS

PS-3.1 Access

The project area is located within Mkuze Town under the Umkhanyakude district Municipality. Access to Mkuze is via National Road N2 Northbound from Durban turning right into Kingfisher Road at Mkuze. The site of the Mkuze Wastewater Treatment Works is situated approximately 2km due north-east from the Mkuze Town CBD and is accessible by gravel road.
The coordinates of Mkuze WWTW are as follows:

27° 36' 36.18"S and 32° 2' 56.53"E.

Limitations

The following limitations characterise the site in terms of pipeline construction:

- The construction of the required wastewater treatment infrastructure will be within the fenced off area of the existing Mkuze wastewater treatment plant. The contractor's activities will be restricted to the fenced off construction site.
- The contractor will be required to take precautions and ensure that the functions of the existing wastewater treatment systems are not interrupted in any way as a result of construction activities.
- Access to Mkuze Wastewater Treatment Works will be constructed close to existing farming areas and extra care will have to be exercised with regards the activities of the Contractor's labour while they are on site to ensure that there is no undue damage to private property as a result of construction activities.
- The Contractor will require to ensure that the insurances for the works cover any damage that may occur to private properties as a result construction activities. Should there be any claims against the contractor resulting from construction activities, the Engineer will ensure that these have been addressed or the damages rectified prior to the release of the retention held on the contract.

PS-4 NATURE OF GROUND AND SUBSOIL INVESTIGATIONS

Subsoil geotechnical investigations have been undertaken on the site and the geotechnical investigations report is included under Part C4: Site Information. No responsibility is accepted for any conclusions drawn by Tenderers from the results and information supplied (if any) and Tenderers must satisfy themselves as to the nature of materials to be excavated under this contract.

PS-5 ENGINEERING AND DESIGN

PS-5.1 Design Services and Activity Matrix

The following matrix of responsibilities for design of permanent and temporary works will apply:

Activity **Work designed by, per design stage**	**Responsible Party**
Concept, feasibility and overall process	Employer
Basic engineering and detail layouts to tender stage	Employer
Final design approved for construction stage	Employer
Temporary works	Contractor
Permanent Works, including structural design and certification of prefabricated tank	Contractor
Preparation of as built drawings	Contractor & Employer's Agent

PS-5.2 Employer's Design

The Employer's design will be for all permanent works and will be detailed in drawings, site instructions the technical specifications to be issued with the tender documents and issued during construction.

PS-5.3 Design Brief

The contractor will be responsible for design of the following (which are all subject to approval by the Engineer):

- Site layouts for the contractor's camp and office accommodation
- Site layouts for the Engineer Representative's temporary office accommodation
- Construction Methodology
- Formwork
- Scaffolding and all staging work
- All other temporary works
- Concrete Mix designs

The costs of the designs will be deemed to have been included in the scheduled items in the Schedule of Quantities. No other additional payments will be certified to cover these activities.

PS-5.4 Drawings

The following drawings will be required to be prepared by the contractor as a minimum:

- Site layouts for the contractor's camp and office accommodation
- Site layouts for the Engineer Representative's temporary office accommodation
- Scaffolding and all staging work

The costs of the designs will be deemed to have been included in the scheduled items in the Schedule of Quantities. No other additional payments will be certified to cover these activities.

The tender drawings are applicable to the contractor are detailed in Part C5 of these documents. These drawings have been used for setting up the Bills of Quantities.

PS-5.5 Design Procedures

The contractor will be required to furnish the following designs for approval by the Engineer at the indicated times:

- Site layouts of the Contractor's camp and office accommodation – within 14 days from commencement date of the contract and in any case prior to the erection of the contractor's camp and offices

- Layouts for the Engineer's representative office – within 10 days from commencement date of the contract and in any case prior to the erection of the Engineer's Representative's temporary office premises.

- Formwork design – within 10 days of commencement of work and in any case prior to the construction of permanent reinforced concrete works.
- Scaffolding and all staging work – within 10 days of commencement of work and in any case prior to the construction of permanent reinforced concrete works.
- Concrete Mix Designs for the all classes of concrete as measured in the Schedule of Quantities prior to the placement of any concrete work

The costs of the designs will be deemed to have been included in the scheduled items in the Schedule of Quantities. No other additional payments will be certified to cover these activities.

PS-5.6 Interface with other Contractors

The contractor may be required to provide access to other contractors undertaking work as per the parallel contracts. The costs of this interface will be deemed to have been allowed for in the appropriate items in the Schedule of Quantities. No other additional payments will be certified to cover these activities.

PS-6 CONSTRUCTION AND MANAGEMENT REQUIREMENTS

PS-6.1 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.

Certain aspects however require further attention as described hereafter.

PS-6.2 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-6.3 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-6.4 Disposal of spoil or surplus material *(Read with SANS 192-1: 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-6.5 Testing *(Read with SANS 1921 – 1 : 2004 clause 4.11)*

PS-6.5.1 Process control

The Contractor shall arrange for all tests required for process control to be done by a laboratory acceptable to and approved by the Engineer.

The Contractor may establish his own laboratory on site or he may employ the services of an independent commercial laboratory. Whatever method is used, the Contractor must submit the results of tests carried out on materials and workmanship when submitting work for acceptance by the Engineer. The costs for these tests shall be deemed to be included in the relevant rates and no additional payment will be made for testing as required.

PS-6.5.2 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-6.6 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-6.7 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-6.8 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-6.9 Overhaul

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

PS-6.10 Excavations

Due to the depths of reservoir excavations, the Contractor is to allow in their tendered rates for excavation, for shoring and protection of excavations. No additional payment will be made for protection of excavations for whatever reason.

PS-6.10 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-7 CONSTRUCTION PROGRAMME

PS-7.1 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.

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.

In determining his construction programme, the contractor should allow for disruptions/stoppages/requirements and intermittent “hold” of work while awaiting Engineer’s inspections at the following critical stages:

Stage		Delay
1.	Setting of civil structures, buildings and pipeline routes and before excavation	1 day
2.	Excavation works for pipelines and prior to preparation of bedding	1 day
3.	Following preparation of bedding and laying of pipes and prior to backfilling.	1 day
4.	Prior to commencement of pressure testing of pipelines	1 day
	Completion of bulk excavations and prior to placing blinding and/or surface preparations	1 day
	Completion of placement of shuttering and prior to casting of concrete	1 day

No additional payments, other than through scheduled items, will be made for these stoppages/disruptions/constraints.

In addition, the contractor is required to establish the Engineer’s facilities within 14 days of commencement. Should the contractor fail to provide approved establishment within the stipulated 14 days, the contractor will pay a penalty calculated as follows:

- Mileage of the Engineer's Representative from other offices from the nearest business centre to site and back to office at R4.50/km.
- Rented Office space equivalent to that stipulated in this contract at offices in Mkuze or other place closer to the site.

The Employer intends to award this contract for commencement of construction works by August 2023.

PS-7.2 Programme in terms of Clause 5.6 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, 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. The Contractor's attention is also drawn to clause 5.7.1 of the General Conditions of Contract 2015.

The Employer intends to award this contract for commencement of construction works by August 2023.

PS-8 SITE FACILITIES AVAILABLE

PS-8.1 Contractor's camp site and depot *(Read with SANS 1921 - 1 : 2004 clause 4.14)*

The Contractor will be permitted to locate his offices, storage facilities, workshops, latrines, etc, on a site approved by the Engineer, in liaison with the community.

Temporary buildings and fencing are to be neat and presentable and the surrounding areas must at all times be kept in a neat, clean and orderly condition. The Contractor must not cut down or damage any trees nor make any excavation without the written permission of the Engineer and will be required to restore the site to its original condition on completion of the Works.

All buildings and latrines shall be in accordance with the Local Authority and State Heath regulations and shall be kept in a clean, sanitary condition to the satisfaction of the Engineer.

PS-8.2 Accommodation of Employees

No employees except for security guards will be allowed to sleep or be accommodated on the site in urban areas.

No housing is available for the Contractor's employees and the Contractor shall make his own arrangements to house his employees and to transport them to site.

No informal housing or squatting will be allowed.

The Contractor shall provide the necessary ablution facilities at his camp site and the site of the works for the use of his employees. Chemical toilets only will be allowed where temporary facilities have to be provided.

PS 8.3 Source of Water Supply

The Contractor shall make his own arrangements for the supply of water for construction purposes. The source of water shall be subject to the approval of the Engineer.

The Water Services Authority (WSA) and Water Services Provider (WSP) in the area is Umkhanyakude District Municipality. Should the contractor's source of water be Umkhanyakude District Municipality, the contractor will be required to ensure that the water account with the WSP is in good standing prior to the issue of completion certificate. The Engineer will withhold any payments until arrears are cleared with the WSP.

PS 8.4 Source of Power Supply

The power supply authority is Eskom. The Contractor will be required to make his own arrangements with, and pay all the requisite connection and consumption charges to Eskom for whatever temporary power supplies he may require for his use on the site and his tender will be held to include for all such costs and charges.

PS-9 SITE FACILITIES REQUIRED

PS-9.1 Facilities Required for the Engineer

PS 9.1.1 Temporary/Permanent Offices

The Contractor shall be asked to provide a temporary office for use by the Engineer. The offices should be able to accommodate one full time Engineer's Representative and two assistants. The temporary offices should be of modular type (Parkhomes Specification/M Projects or similar). The walls and doors should be made of 40mm polystyrene insulation with Chromadek cladding internally and externally. The ceiling shall be made of 40mm white Chromadek insulated panels. The 2 No. windows are to be made of aluminium with aluminium burglar guards and vertical blinds.

The Engineer's offices are to be equipped with the following as a minimum:

- Three desks each with lockable drawers
- Three high back swivel chairs
- Three visitors chairs
- A facility to store/hang drawings
- An electric refrigerator of at least 200 litres capacity

The Contractor should also make arrangements for covered facilities to enable the accommodation of approximately 12– 16 people during progress site meetings, to be held fortnightly or monthly.

The facilities are to be provided, to the satisfaction of the Engineer, within 14 days of commencement date. The Engineer may withhold certification of the first progress payment (and subsequent payments, as appropriate) until these facilities are provided.

PS 9.1.2 Computer/IT Facilities

The Contractor shall provide the Engineer's Representative with the following computer equipment to be used solely to generate site administration documents such as Minutes of Site Meetings, Inspection Forms, etc:

- A functional laptop complete with mouse and bag, with at least 500GB Hard Drive, Intel Processor and 2GB RAM, all supplied new. The laptop software to include MS Windows and full MS Office software(Excel, MSWord, MS Power Point,)

- A 3 in 1 (printer/scanner/fax) printer capable of printing black and white copies at the rate of 7 pages per minute to a resolution of 600 x 600 rendered dpi.

The hardware and software will revert to the Contractor on completion of the contract. Perishables such as toners (for the printer) paper for printing, will be paid for separately under a Provisional Sum provided for in the Schedule of Quantities.

The facilities are to be provided, to the satisfaction of the Engineer, within 14 days of commencement date. ***The Engineer may withhold certification of the first progress payment until these facilities are provided***.

PS 9.1.3 Laboratory Facilities

The Contractor will not be required to provide a testing laboratory on site for use by the Engineer. However, the contractor will be required to provide the following:

- Concrete cube strength test results from a recognised laboratory for all concrete poured on site.
- Compaction test results for all roadworks layerworks and embankment backfill as detailed
- Compaction test results for bedding and backfill material along pipelines trenches

The contractor should therefore include in their tendered rates the costs for the requisite concrete cube tests.

PS 9.1.4 Sanitary Facilities

All latrines shall conform to the requirements of the Local Authority and shall be subject to approval by the Engineer. All sanitary fees and charges due under the Local Authority or State Health Regulations or bylaws shall be paid by the Contractor. Throughout the progress of the contract, all latrines shall be maintained by the Contractor in a clean, sanitary condition to the satisfaction of the Engineer.

PS 9.1.5 Telephone Facilities

The Contractor will not be required to provide a telephone for use by the Engineer. The contractor will however be required cove cellphone costs for the engineer's site staff for airtime valued at R150/week. Appropriate items have been provided in the Schedule of Quantities to cover these costs.

PS 9.1.6 Housing Facilities

The Contractor will not be required to provide housing facilities for the Engineer's staff. However, a provisional sum has been provided in the schedule of quantities for payment through the contract for accommodation for the Engineer's staff.

PS 9.1.7 Parking Facilities

The Contractor will be required to provide two uncovered parking bays for the Engineer.

PS 9.1.8 Engineer's Transport

The Contractor will not be required to provide transport for the Engineer's staff.

PS 9.1.9 Security

The Contractor will be responsible for providing adequate security for the Works and for the site establishment. All costs associated with the provision of security staff shall be borne by the Contractor and should allowed for in the rates tendered for items in the Schedule of Quantities. No additional payments will be made for security measures taken during the contract period, other through the schedule items in the Schedule of Quantities.

PS 9.1.10 Survey Equipment

The contractor shall provide the following survey equipment, in good condition, for use by the Engineer throughout the duration of the contract:

- A dumpy level
- Measuring tape

- An assistant, when required, to assist the Engineer to operate survey equipment, when provided

PS 9.1.11 Contract staff to assist the Engineer

The following staff will be recruited by the contractor to assist the Engineer in carrying out his services:

Description of Staff	No. Required	Remarks
Environmental Monitoring	One	Provisional sum provided for appointment as directed by the Engineer. Personnel directed by and report to Engineer
Technical Assistant	One	
Geotechnical Consultant	One	
Community Liaison Officer	One	
Health and Safety Inspector	One	
Independent inspectors	TBA	

The required personnel will be identified by the Engineer and report to the Engineer. Provisional Sums and the relevant mark-up Items are provided for in the Schedule of Quantities to cover these costs

PS 10. EXISTING SERVICES

PS 10.1 Care, Damage and Protection

Known services will be indicated in the tender and contract documents. The Contractor will be responsible for identifying all services with the relevant Service Providers.

The Contractor shall familiarize himself with all services and expose them at the start of the Contract to verify their position and establish their depths.

No additional payment will be made to the Contractor for identifying and locating services. Therefore the Contractor will have to include the costs thereof in the scheduled items in the Schedule of Quantities.

Any information regarding existing services is given in good faith and without guarantee.

PS 10.2 Blasting

No blasting will be permitted unless the Contractor can satisfy the Engineer that his proposed blasting methods and controls are such that no damage will be caused to the adjoining building structures, pipelines or services. In any event the Engineer will require the Contractor to plan and execute each blast in such a manner as to ensure that no damage will be caused to any structure, pipeline or service. In addition, the Engineer will require vibro-recordings to be taken at no additional cost to the Employer. No blasting is to be carried out in Eskom servitudes or wayleaves unless the Eskom authorities have been advised in writing three weeks prior to blasting. Where blasting is done adjacent to Eskom power lines, the Contractor shall arrange for a representative of Eskom to be present prior to and during any blast.

PS 10.3 Environmental Aspects

The Contractor will be required to plan and undertake his work in a manner that minimises its impact on the natural environment. Trees and other vegetation shall, wherever possible, be left undisturbed. Trees that are marked by the Engineer shall not be damaged and in the event of the Contractor doing so, a penalty will be deducted from monies due to the Contractor.

Every effort shall be made by the Contractor to prevent pollution of the adjacent areas and river and to reduce the noise, dust and fumes emanating from his construction activities.

PS 10.4 Dealing with Water

Where necessary, the Contractor shall construct temporary drainage channels to divert ground water from his excavation and excess water must be pumped out.

No compensation for any variation of the actual conditions during construction from the data given will be considered. Neither will additional compensation be considered for data omitted or inaccurately given.

The rates tendered shall allow for the requirements of this clause and all incidentals.

PS 10.5 Servitudes and Rights of Way

The Employer will, where necessary, obtain permanent servitudes and rights of way along the road routes indicated on the tender drawings. New servitudes will only be registered after completion of the Works.

PS 10.6 Dealing with Damaged Services

In the event of any service being damaged or accidentally disconnected for any reason, the Contractor shall immediately contact the relevant authority for instruction and shall report the occurrence of the incident. The damage is to be repaired as soon as possible to the approval of the Engineer and the authority. The Contractor will be held responsible for paying all costs incurred by the authority or himself as a result of each such incident, where relevant.

PS 10.7 Accommodation of Traffic

The Contractor shall ensure the safe and expeditious passage of traffic at all times and shall provide all necessary temporary road traffic signs, barricades, flagmen, etc to safeguard the travelling public. Any detours or bypasses constructed by the Contractor shall be adequately signposted, as per the South African Road Traffic Signs Manual, and maintained in such a manner as to provide safe and easy passage of traffic.

PS 10.8 Spoil Material

No indiscriminate spoiling of material will be allowed. All surplus or unsuitable material shall be spoiled, levelled and spread in designated areas as directed by the Engineer. All haul will be regarded as freehaul.

PS 10.9 Finishing and Tidying and Defects Liability Period

On no account must rubble and spoil materials, other materials, equipment or unfinished operations be allowed to accumulate in such a manner as to unnecessarily impede the activities of other Contractors or Authorities.

Finishing and tidying must not simply be left until the end of the construction period. The Contractor will be entitled, subject to prior agreement with the Engineer and within reasonable limits, to request that work in a particular area and/or work of a particular discipline, be inspected for partial completion. The specified defects liability period in respect of any specific section of the Works shall commence on the date on which the relevant section is accepted by the Engineer as being completed, i.e. fully commissioned, including finishing and tidying.

On completion of the Contract the Contractor shall ensure that all materials used in the construction of the temporary Site office, workshop and storage yard are removed from Site. Waste materials such as construction debris and soil contaminated with oil and fuel are to be disposed of at the solid waste disposal site used approved by the Engineer. Prior to the handover of the Site to the Employer, the Contractor and the Engineer will conduct a post construction audit to determine if any additional measures that are to be taken. The Completion Certificate will only be issued after this stage.

PS 10.10 Employee Accommodation

(See Subclause 3.2.1 of Section A of Part 2 and Subclause 1.2.1 of Section A of Part 3 of SABS 0120)

The Contractor shall conform in all respects with the provisions of any Act, Regulations or By-Law of Department of Human Settlement, which may be applicable to employee accommodation. Save for a security guard on active duty, no employees may be housed on Site or the Contractor's campsite after normal working hours.

PS 10.11 Employment of Local Labour

The Employer has determined that 100% of the Contractor's unskilled labour force shall be made up from the local community. A labour sub-committee (of a Project Steering Committee) comprising representatives of the community and other stakeholders will be responsible for the recruitment of all local labour. The Contractor will be required to provide details of the numbers of semi-skilled and unskilled workers he will require, together with their anticipated starting dates. The PSC through its labour sub-committee will then make this labour available to the Contractor.

A minimum of 50% of the local labour shall comprise of women and, where appropriate, disabled labour shall be employed. It is a requirement that tenderers acquaint themselves fully with requirements for registration with Unemployment Insurance Fund.

The Employer requires that the successful contractor registers all labour with the Unemployment Insurance Fund. The local labour rate has been determined at R29.37 per hour per labourer per day or as may be advised by Department of Human Settlement from time to time. This is a net rate excluding UIF contributions. The task for excavation by hand has been agreed at 2,4 m^3/day (e.g. 0,76 m x 1,0 m x 3,15 m).

During project execution, the successful contractor will be required to provide progress reports indicating to what level these requirements have been met.

PS 10.12 Frequency of Labour Wages Payments

The contractor will be required to pay labour on a fortnightly basis

PS 10.13 Training and Capacity Building

During project execution, it is the desire of the Employer that an identified number of community members receive appropriate level of non accredited training in either pipelaying activities or construction management activities. Within 14 days of appointment, the successful contractor will be required to provide, together with his method statement, a proposal for consideration by the Project Steering Committee for activities in which the community members can receive training. This proposal will be considered by the Project Steering Committee after which the Contractor will be given an instruction on the training to provide. Training will be provided to local labour that is already in the employ of the contractors as per clause PS 10.11. It must be noted that the Contractor will be required to pay the labour based on their daily rates indicated in PS 10.11.

The operators of the infrastructure to be provided will require training at commissioning stage. Training shall be be provided under the contract and will include provision of training and operation and maintenance manuals.

Should the contractor fail to provide this training, the Employer reserves the right to seek training from alternative sources. In that case, the cost of the training sought will be deductible from any monies due to the contractor.

A provisional sum has been provided in the schedule of quantities for training by a nominated subcontractor as necessary.

PS-11 REQUIREMENTS FOR ACCOMMODATION OF TRAFFIC

PS-11.1 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-11.2 Basic Requirements

The travelling public shall have the right of way on public roads, and the Contractor shall make use of approved methods to control the movement of his equipment and vehicles so as not to constitute a hazard on the road.

The Contractor shall ensure that all road signs, barricades, delineators, flagmen and speed controls are effective and that courtesy is extended to the public at all times.

Failure to maintain road signs, warning signs or flicker lights, etc, in a good condition shall constitute ample reason for the Engineer to suspend the work until the road signs, etc, have been repaired to his satisfaction.

The Contractor may not commence constructional activities affecting existing roads before adequate provision has been made to accommodate traffic in accordance with the requirements of this document and the South African Road Traffic Signs Manual.

The Contractor shall construct and maintain all temporary drainage works necessary for temporary deviations.

The Contractor shall provide and grant access to persons whose properties fall within or adjoin the area in which he is working.

PS-11.3 Traffic Safety Officer

Where warranted by traffic conditions on or near the site, the Contractor shall nominate a suitable member of his staff as traffic safety officer to be responsible for the arrangement and maintenance of all the measures for the accommodation of traffic for the duration of the project. Duties of the traffic safety officer shall be as set out in SANS 1921 Part 2 and shall also be in compliance with the Occupational Health and Safety Act No 85 of 1993 and the Construction Regulations 2003.

PS-11.4 Payment

The Contractor’s tendered rates for the relevant items in the Bill of Quantities shall include full compensation for all possible additional costs which may arise from this, and no claims for extra payment due to inconvenience as a result of the modus operandi will be considered.

Items that may be considered for payment are specified in SABS 1200 Standardized Specifications and the related project specification.

PS-12 OCCUPATIONAL HEALTH AND SAFETY *(Read with SANS 1921 - 1: 2004 clause 4.14)*

PS-12.1 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 mandatary 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-12.2 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-12.3 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-13 ADVERSE WEATHER CONDITIONS

In terms of Clause 42.3 of the General Conditions of Contract, extension of time will be considered for **abnormal rainfall**. The numbers of days per month on which work is expected not to be possible as a result of **normal rainfall**, and for which the Contractor shall make provision in his tendered rates, prices and programme, are listed in Table PS-12.1 hereafter. Only the number of days lost as a result of adverse weather conditions, exceeding the number of days listed in Table PS-12.1, will qualify for consideration of extension of time.

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-13, 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-13: Expected Nº of Working Days Lost Monthly Due to Normal Rainfall

MONTH	Expected number of working days lost as result of normal rainfall
JANUARY	**5*
FEBRUARY	*5*
MARCH	*4*
APRIL	*1*
MAY	*1*
JUNE	*1*
JULY	*1*
AUGUST	*1*
SEPTEMBER	*2*
OCTOBER	*3*
NOVEMBER	*4*
DECEMBER	*5*
TOTAL	***33 days***

(Based on information obtained from the Weather Bureau, Department of Environment Affairs. The average monthly rainfall figures quoted, are included for information and palnning in terms of programming of the works. These shall be taken into consideration for calculation of extension of time. The number of working days lost for December and January allows for the builders' holidays)

PS-14 SITE MEETINGS AND REPORTING

The Contractor will be required to attend site meetings organised by the Engineer. In these meetings he (the Contractor) will be required to provide progress reports and other reports to monitor the outputs of the contractor, as may be required from time to time, to be presented in a format prescribed by the Engineer. The frequency of such meetings will be monthly, as a minimum. However the frequency can be reviewed, depending on the progress of the contract.

PS-15 PREFERENTIAL PROCUREMENT

For the purpose of this contract the Contractor shall comply with the preferential procurement statement provided in F.3.11 and T2.2 of the Tender Data.

PS-16 EPWP SPECIFICATION

PS-16.1 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 outlined in Table 1:

Table 1: Skills programme for supervisory and management staff

Personnel	NQF level	Unit standard titles	Skills programme description
Foreman / Supervisor	***4***	Implement Labour-Intensive Construction Systems and Techniques.	This unit standard must be completed, **and**
		Use Labour-Intensive Construction Methods to Construct and Maintain Roads and Stormwater Drainage	any one of these 3 unit standards
		Use Labour-Intensive Construction Methods to Construct and Maintain Water and Sanitation Services	
		Use Labour-Intensive Construction Methods to Construct, Repair and Maintain Structures	
Site Agent / Manager (i.e. the contractor's most senior representative that is resident on the site)	***5***	Manage Labour-Intensive Construction Processes	Skills Programme against this single unit standard

PS-16.2 Employment of Unskilled and Semi-Skilled Workers in Labour-Intensive Works

PS-16.2.1 Requirements for the sourcing and engagement of labour.

PS-16.2.1.1 Unskilled and semi-skilled labour required for the execution of all labour intensive works shall be engaged strictly in accordance with prevailing legislation in accordance with the Code of Good Practice for the Expanded Public Works Programme.

PS-16.2.1.2 The following are some of the considerations that are elaborated in the Code of Good Practice for Expanded Public Works Programmes.

PS-16.2.2 Training of Targeted Labour

PS-16.2.2.1 The contractor shall provide all the necessary 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 in a manner that does not compromise worker health and safety.

PS-16.2.2..2 Accredited training may be provided before the commencement of a project.

PS-16.2.2.3 The cost of accredited training of targeted labour will be funded through various funding sources such as National Skills Fund from the Department of Higher Education and Training, funds from the Implementing Public body, funding from SETAS etc. This training should take place as close to the project site as practically possible. The Public Body implementing the project must ensure that training applications for beneficiaries are made by its relevant project manager assisted by relevant training officials from the National Department of Public Works.

PS-16.2.2.4 The Public Body must ensure that preference of the training of beneficiaries in technical skills over life skills is made. In addition, the Public Body is required to maximize

opportunities for training to beneficiaries to be carried out before the implementation of projects.

PS-16.2.2.5 The Public body must ensure that workers who have received training will be placed on the project to work after receiving the training.

PS-16.2.2.6 If a provisional sum for training is made in the contract the contractor shall pay an allowance equal to 100% of the daily wage rate to workers who attend accredited training.

PS-16.3 Generic Labour-Intensive Specification

The Generic Labour-intensive specification below (informed by SANS 1921-5, Construction and management requirements for works contracts - Part 5: Earthworks) covers activities which are to be performed by hand, and should be included in the scope of works without amendment or modification as set out below.

This specification establishes general requirements for activities which are to be executed by hand involving the following:

- ☐ trenches having a depth of less than 1.5 metres
- ☐ stormwater drainage
- ☐ low-volume roads (typically less than 500 vehicles per day);
- ☐ sidewalks and non-motorised transport infrastructure
- ☐ water and sanitation

PS-16.3.1 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.

PS-16.3.2 Hand excavateable material

Hand excavateable material is:

a) granular materials:

i) whose consistency when profiled may in terms of table 2 be classified as very loose, loose, medium dense, or dense; or

ii) where the material is a gravel having a maximum particle size of 10mm and contains no cobbles or isolated boulders, no more than 15 blows of a dynamic cone penetrometer is required to penetrate 100mm;

b) cohesive materials:

i) whose consistency when profiled may in terms of table 2 be classified as very soft, soft, firm, stiff and stiff / very stiff; or

ii) where the material is a gravel having a maximum particle size of 10mm and contains no cobbles or isolated boulders, no more than 8 blows of a dynamic cone penetrometer is required to penetrate 100mm;

Note

1. A boulder is material with a particle size greater than 200mm, a cobble and gravel is material between 60 and 200mm.

2. A dynamic cone penetrometer is an instrument used to measure the insitu shear resistance of a soil comprising a drop weight of approximately 10 kg which falls through a height of 400mm and drives a cone having a maximum diameter of 20mm (cone angle of 60° with respect to the horizontal) into the material being used.

Table 2: Consistency of materials when profiled

GRANULAR MATERIALS		COHESIVE MATERIALS	
CONSISTENCY	**DESCRIPTION**	**CONSISTENCY**	**DESCRIPTION**
Very loose	Crumbles very easily when scraped with a geological pick.	Very soft	Geological pick head can easily be pushed in as far as the shaft of the handle.
Loose	Small resistance to penetration by sharp end of a geological pick.	Soft	Easily dented by thumb; sharp end of a geological pick can be pushed in 30-40 mm; can be moulded by fingers with some pressure.
Medium dense	Considerable resistance to penetration by sharp end of a geological pick.	Firm	Indented by thumb with effort; sharp end of geological pick can be pushed in upto 10 mm; very difficult to mould with fingers; can just be penetrated with an ordinary hand spade.
Dense	Very high resistance to penetration by the sharp end of a geological pick; requires many blows for excavation.	Stiff	Can be indented by thumb-nail; slight indentation produced by pushing geological pick point into soil; cannot be moulded by fingers.
Very dense	High resistance to repeated blows of a geological pick.	Very stiff	Indented by thumb-nail with difficulty; slight indentation produced by blow of a geological pick point.

PS-16.3.3 Trench excavation

All hand excavateable material in trenches having a depth of less than 1,5 metres shall be excavated by hand.

PS-16.3.4 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.

PS-16.3.5 Excavation

All hand excavateable material including topsoil classified as hand excavateable 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.

PS-16.3.6 Clearing and grubbing

Grass and small bushes shall be cleared by hand.

PS-16.3.7 Shaping

All shaping shall be undertaken by hand.

PS-16.3.8 Loading

All loading shall be done by hand. Haulage equipment should be selected in a manner that allows loading by hand to the extent possible.

PS-16.3.9 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.

PS-16.3.10 Offloading

All material, however transported, is to be off- loaded by hand, unless tipper-trucks are utilised for haulage.

PS-16.3.11 Spreading

All material shall be spread by hand.

PS-16.3.12 Compaction

Small areas may be compacted by hand provided that the specified compaction is achieved. Appropriate rollers should be used where higher (than can be achieved by hand) levels of compaction are required.

PS-16.313 Grassing

All grassing shall be undertaking by sprigging, sodding, or seeding by hand.

PS-16.314 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.

PS-16.3.15 Manufactured Elements

Elements manufactured or supplied 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.

PS 17 SUCONTRACTING OF A PROTION OF THE CONTRACT

The successful Tenderer will be required to employ local and disabled people and moreover, subcontract up to a maximum of 30% of the project value to local contractors. The “local

contractors" will be located in the Umkhanyakude District Municipality area of jurisdiction and where specifically required by the Employer, the area where construction works are being undertaken.

PROJECT SPECIFICATION: PORTION 2
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.

PROJECT SPECIFICATION : PORTION 2

SABS 1200 PSA: GENERAL

PSA-3 MATERIALS

PSA-3.1 Quality

Where there is a standardization mark programme for any material, all such material supplied shall bear the official standardization 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-3.3 Applicable Standards for Cement (*Additional Subclause*)

The standard cement specifications SABS 471, SABS 626, SABS 831 and SABS 1466, referred to in clause 3.3, have been withdrawn and are replaced by the new SANS 50197-1 and -2: Common cements, and SANS 50413-1 and -2: Masonry cement. These specifications will be applicable to this contract, and the descriptions and types of cements specified, will be based on the designations as defined in these specifications.

PSA-4. PLANT

PSA-4.2 Contractor's Office, Stores and Services

The Contractor's camp shall be kept neat and clean at all times and all surplus or rejected material shall be removed from the site.

PSA-5 CONSTRUCTION

PSA 5.1 Survey

PS A 5.1.1 Setting Out Of The Works

Substitute the first sentence in A 5.1.1 with the following:

“Setting out of the works is the sole responsibility of the Contractor and shall be done from survey beacons identified by the Engineer. The Contractor shall, within two (2) weeks after the site has been handed over to him, confirm himself that the survey beacons are correct. Any discrepancy shall immediately be reported in writing to the Engineer. Any costs or subsequent costs arising from discrepancies, which had not been reported to the Engineer within the aforementioned period, shall be the sole responsibility of the Contractor. A grid of final terrace levels over the site of the works will be issued to the Contractor at the commencement of the contract and it is the Contractors responsibility to preserve all setting out pegs based on this information as given for the duration of the contract.”

PS A 5.4 Protection Of Overhead And Underground Services

Add the following paragraph :

”The Contractor shall as soon as possible after handing over of the site, commence with the detection to existing services, continue with it without interruption, and finalise it at least 7 days before excavation starts at that particular section.”

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-5.9 Accommodation of Traffic (*additional subclause)*

Where construction work has to be carried out on or near public roads, the Contractor shall deal with traffic as specified in 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 is also referred to Project Specification PS-10.

PSA-8. MEASUREMENT AND PAYMENT

PSA-8.3 Scheduled fixed-charge and value-related items

PSA-8.3.2 Establishment of Facilities on the Site

PSA-8.3.2.1 Facilities for the Engineer

Add the following additional subitems:

(d) Carports (*state number)* Unit : Sum

The tendered rate shall cover all costs as specified in Subclause 8.3.2.3 of SABS 1200 A (and 5.5 of SABS 1200 AB to provide these facilities as specified in Clauses PSAB-3.2, 3.3 and 4.2. if applicable).

PSA-8.3.2.2 Facilities for Contractor

For this contract the facilities for the Contractor will not be measured and paid for separately as itemised in Subclause 8.3.2.2. The subitems (a) to (j) will be consolidated into one item and payment under item PSA-8.3.2.2 shall be deemed to cover all these subitems.

PSA-8.4 Scheduled time-related items

PSA-8.4.2 Operation and maintenance of Facilities on Site

PSA-8.4.2.1 Facilities for Engineer

Add the following additional subitems:

(e) Carports .... Unit : Sum
(f) Survey instruments .... Unit : Sum

The rates tendered shall cover all costs as specified in Subclause 8.4.2.3 of SABS 1200 A and 5.5 of SABS 1200 AB to operate and maintain these facilities as specified in Clauses PSAB-3.2, 3.3 and 4.2.

PSA-8.4.2.2 Facilities for Contractor

Consolidate subitems (a) to (j) of Clause 8.4.2.2 into one item as in PSA-8.3.2.2. Payment under PSA-8.4.2.2 shall be deemed to cover subitems (a) to (j).

PROJECT SPECIFICATION : PORTION 2

SABS 1200 PSD : EARTHWORKS

PSD-1 EARTHWORKS

The Contractor is referred to SANS 1921 - 5: Earthworks activities which are to be performed by hand

PSD-3 MATERIALS

PSD-3.1 Classification for excavation purposes

PSD-3.1.2 Classes of excavation

The classes of excavation in clause 3.1.2 shall in general apply to all excavations where use is made of conventional methods and plant and equipment.

Where labour-intensive methods applicable to targeted labour are specified, soft excavations shall be defined as follows:

"PSD-3.1.2(a) Soft excavation

Soft excavation for labour-intensive work where excavations are to be carried out by hand methods, shall be excavation in material that can be efficiently removed and loaded with picks, shovels and other hand tools by an average able-bodied person or group of persons. Soft excavation shall include small boulders that can be removed by hand methods.

Soft excavation can be further broken down by introduction of an additional class such as "Soft Excavation Class A", which is excavation defined as soft, but which can only be excavated with difficulty.

The criteria for classifying Soft Excavation Class A shall be as follows:

Granular material: - dense material with high resistance to penetration by the point of a geological pick; several blows are required for removal of material; 7 to 15 blows of the dynamic cone penetrometer are required to penetrate 100 mm; and

Cohesive materials -stiff to very stiff material requiring 6 to 8 blows of the dynamic cone penetrometer to penetrate 100 mm, where:

"stiff" material can be indented by thumbnail; slight indentation produced by pushing a geological pick point into the soil; cannot be moulded by fingers; and where:

"very stiff" materialcan be indented by thumbnail with difficulty; slight penetration of point produced by blow of geological pick.

Where soft excavation class A material is encountered, it shall be measured and paid for as an extra over soft excavation.

PSD-5 CONSTRUCTION

PSD-5.1 Precautions

PSD-5.1.1 Safety

PSD-5.1.1.2 Safeguarding of excavations

- ***Add the following subparagraph:***

"(g) The Contractor or his agent or his representative shall **not** require or allow any person to work under unsupported overhanging material or in an excavation which is more than 1,5 m deep, and any excavation which has not been adequately supported or braced if there is a danger of the overhanging material or the sides of the excavation collapsing. The support, shoring or bracing to be designed and constructed by the Contractor, shall be strong and sturdy enough to support the sides of the excavation in question."

PSD-5.2.2.1 Excavations for general earthworks and for structures

- ***Add the following additional subparagraph:***

"(f) The Contractor shall so plan his cut-to-fill operations that all excavated material is used in the manner that is most appropriate.

The Contractor shall conserve all suitable surplus material and he shall not borrow, spoil or waste any material unnecessarily. If excavated material designated for a particular purpose become contaminated, is incorrectly used or becomes unavailable through injudicious planning of excavation operations, the Contractor shall replace the contaminated material and make good any shortfall with material of quality at least equal to that of the said selected material.

Where selection of excavated material is required, the method of excavation shall be so arranged as to avoid double handling. Wherever possible excavated material shall be placed in its final position without being stockpiled. If stockpiling is unavoidable, materials intended for different uses shall be stockpiled separately

PROJECT SPECIFICATION : PORTION 2

SABS 1200 PSDB : EARTHWORKS (PIPE TRENCHES)

PSDB-5 CONSTRUCTION

PSDB- 5.1 Precautions

PSDB-5.1.5 Trench Excavations *(additional subclause)*

The precautions for excavations as specified in Clause 5.1.1 of Section 1200 D, 1200 DA, and the relevant clauses in PSD and PSDA, shall also apply to all trench excavations.

The Contractor shall take all the steps necessary to ensure that no person is required or allowed to work in a trench or any other unsupported overhanging excavation which is more than 1,5 m deep, and any excavation which has not been adequately supported, shored or braced if there is any danger whatsoever of the sides of the excavation collapsing. The support, shoring or bracing to be designed and constructed by the Contractor, shall be strong and sturdy enough to support the sides of the excavation in question.

PROJECT SPECIFICATION : PORTION 2

SABS 1200 PSGA : CONCRETE (SMALL WORKS)

PS GA-3 MATERIALS

PS GA-3.2 Cement

PS GA-3.2.1 Applicable specifications

The standard cement specifications SABS 471, SABS 626, SABS 831, SABS 1466 and SABS 1491, have been withdrawn and are replaced by SANS 50197-1: Common cements, and SANS 50413-1: Masonry cement. These specifications will be applicable to this contract and the descriptions and types of cements, where specified, will be based on the designations as defined in these specifications.

PS GA-5.4.1.4 Prescribed mix concrete

Add the following :

"The structural concrete in this contract shall comply with the following specification.

- The minimum 28 day strength shall be as specified in drawings
- The maximum water/cement ration shall be 0.42
- The minimum cement content shall be 400 kg/m3
- The cement used must be extended with a minimum of 30% Fly Ash or 50% GGBS

A detailed mix design by an approved concrete testing laboratory before any concrete is poured in the works and provision shall be made by the contractor for the cost of the design in his rates.

PS GA-8: MEASUREMENT AND PAYMENT

PS GA-8.1 Measurement and rates

PS GA-8.1.2 Reinforcement

Replace subclause 8.1.2.2 with the following:

PSGA-8.1.2.2 Mild steel and high tensile steel will be measured by mass for the diameters or range of diameters as scheduled.

Welded mesh will be scheduled separately for each type and mass per square metre of mesh."
Replace subclause 8.1.2.3 with the following:

"PSGA-8.1.2.3 The unit rate for steel bars shall cover the cost of supply, cutting, bending, placing in position, and fixing of the reinforcing and supporting steel scheduled. The rate shall also include the provision of all spacer devices and binding wire, as well as the cost of tests in terms of SANS 920.

The unit rate for welded mesh shall cover the supply, cutting and placing of mesh, as well as the cost of all waste due to laps."

PROJECT SPECIFICATION: PORTION 2

SABS 1200 PS LB: BEDDING (PIPES)

PS LB 3.3 BEDDING

Add the following to LB 3.3:

All pipes shall be classified as rigid pipes and shall be laid on a Class C bedding except sub soil drainage, which shall be classified as flexible pipes.

PS LB 5 CONSTRUCTION

PS LB 5.1 General

PS LB 5.1.4 Compacting

Substitute "90 % of mod AASHTO" in LB 5.1.4 with "93 % of mod AASHTO (100 % for sand)".

PS LB 8 MEASUREMENT AND PAYMENT

PS LB 8.2 Scheduled Items

PS LB 8.2.2.4 From stockpile (provisional)

a) Selected granular material ..... Unit : m^3

b) Selected fill material ..... Unit : m^3

The rate shall cover the cost of obtaining, handling and transport regardless the distance, of the required bedding material from the stockpile, the delivery thereof at positions that are spaced along the trench in such a way as suits the working method of the Contractor, as well as the removal of material displaced by this importation within the free-haul distance.

PROJECT SPECIFICATION: PORTION 2

SABS 1200 PS LD : SEWERS

PSLD 2.3 DEFINITIONS

Add to the Sub-Clause:

Normal Blasting

The method which an experienced blaster employs when carrying out general blasting of hard rock material in trenches.

Close Proximity Blasting

The method which an experienced blaster employs when carrying out blasting of hard rock close to adjacent service or structures requiring additional but smaller charges in order to break up the hard rock without damaging the adjacent services or structures.

PSLD 3 MATERIALS

PSLD 3.1.1 Vitrified Clay Pipes

Delete Sub-Clause 3.1.1.2 and substitute:

Vitrified clay sewer pipes shall be plain ended " Vitro" (or equal) pipes having a crushing strength of at least 45Kn/m. The joints of pipes of 100mm and 150mm diameter shall comprise natural rubber rings within polypropylene couplings.

PSLD 3.1.3 FC Pipes

The FC pipes and fittings comply with the applicable requirements for Series 4 pipes as set out in SABS 819.
The FC pipes and couplings shall be bitumen dipped.

PSLD 3.4 Bedding

Bedding of sewers shall be for flexible pipes (SABS 1200 LB) or concrete encased.

PSLD 3.5.2 Precast Concrete Manhole Sections

Add the following end of the Sub-Clause:

Joints between all wall sections and under roof slab shall be primed and sealed with a plasticized butyl rubber compound ("Bltujoint Putty" by ABE or similar approved) complete with one layer of 200mm wide compatible PVC tape and primer (similar or equal to the "Corro Clad" system supplied by Denso South Africa (Pty) Ltd) to be supplied and applied circumferentially to the outside of each wall section joint.

PSLD 3.5.6 Mortar

Delete the sub-clause and substitute the following:

Mortar for brickwork and, where so ordered by the Engineer, for external plasterwork to manholes shall be composed of one part of cement to three parts of clean pit sand. Mortar for the internal plasterwork to manholes where ordered and to the benching within manholes shall be composed of one part of cement to three parts of sand.

PSLD 3.5.8 Manhole Covers and Frames

Add to the first paragraph of the Sub-Clause:

After installation all exposed portions of the CI cover and frame shall be thorough cleaned and painted with two coasts of approved epoxy tar, particular attention being paid to the painting of the underside of the covers and frames.

Precast concrete manhole cover slabs, adaptor slabs and lids shall comply with the applicable requirements of SABS 1294 and to the details shown on the drawings. The precast concrete cover slab shall be so designed as to withstand a point load in the centre, as specified in Clause 8.7 of SABS 1294, of 50 kN for light duty covers and 100Kn for heavy duty covers. The lifting lugs shall be made of 6mm dia grade 316 stainless steel rod. The openings and undersides of all covers and slabs be coated with two coats of “Proofex 3”.

PSLD 4 PLANT

PSLD 4.1 Pipe Handling and Rigging Equipments

Add to the Sub-Clause

The Contractor will be responsible for clearing the areas required for pipe storage which shall include the removal of rock, stones and all combustible material. He shall also be responsible for maintaining the area in a clean and tidy condition for the duration of the Contract.

Upon delivery of the pipes, fittings, specials and valves, these will be inspected jointly by the Engineer’s Representative and the Contractor. Any pipes, etc found to be damaged shall be returned to the factory for repair or replacement; in which case the costs of additional transport, repair or replacement shall be borne by the Contractor.
The Contractor will be held fully responsible for the care and safety of all pipes and fittings, etc on site and shall bear the cost of all renewals which may be necessary to make good losses, damages or breakages. Furthermore, he shall fully responsible for handling and re-loading material at the storage areas and for transporting and offloading of all such materials to their correct places along the pipeline route.

PSLD 5 CONSTRUCTION

PSLD 5.4 Connections to Manholes

Add the following paragraph to the sub-clause:

The rates tendered for the construction of manholes are to include for whatever additional costs there may be over and above the tendered rates for the supply, lay, joint, bed and test pipelines, for the supply and fixing the short lengths of pipes entering and leaving manholes.

PSLD 5.6.1 General

The underside of all manhole roofs and edges of the access opening therein and precast concrete covers and lids shall be painted with two coats of “Proofex 3” as supplied by Fosroc (Pty) Ltd, P.O. Box 477, New Germany,3620, or similar approved rubberized bitumen coating so as to protect the concrete from the effects of sewage gases.
The tendered rates for manholes shall include for this work.

PSLD 5.6.5 Precast Concrete Manholes

In the first sentence, delete “Delete LD-5” and substitute with “with drawings”

PSLD 5.7 Concrete Casing to Pipes

Add to the sub-clause:

Concrete casing is to be of 20/19 grade concrete with a minimum thickness of 100 mm below, above top and on each side of the pipe as and where ordered by the Engineer.

PSLD 5.9.3 Recording Location

Delete the last sentence and substitute

The records shall be handed to the Engineer, in a form acceptable to the Engineer, at the time when the Contractor claims payment for the relevant work.

PSLD 6 TOLERANCES

PSLD 6.2 Overall Centre-line Control and Manhole Locations

In second line delete “+-300mm” and substitute “+-150mm”

PSLD 6.3 Manhole Invert-levels

In second line read “+- 25mm” for “+-50mm”

PSLD 7 TESTING

PSLD 7.1.4 Sub Clause

Delete the Sub-Clause and substitute the following:

The sewer, and the house connections along its length, shall be tested simultaneously between manholes or chambers, as applicable. The house connections and the section of the sewer under test shall be suitably “plugged” at the open ends using plugs or stoppers which have been braced adequately.

PSLD 7.2.2 Water Test

The Water Test will not be acceptable under this Contract.

PSLD 7.2.6 Watertightness Testing of Manholes

Wherever ordered in writing by the Engineer that a manhole is to be tested, it is to be tested in his presence or in the presence of his authorized representative, in the following manner.

All sewer inlets and outlets to and from the manhole shall be closed with expanding plugs or other apparatus. Water is then to be introduced into the manhole up to a level 25mm below the underside of the roof slab. The water level is to be maintained for not less than one hour or such longer periods as may be necessary to accurately record the rate of leakage, if any. Careful and accurate records shall be kept at frequent and regular intervals of the variation in the level of the water in the manhole and of the quantity of the water added so that the rate of leakage may be properly determined. In the event of the rate of leakage, if any, exceeding 1.25l/h/m of depth of manhole, or in the event of any weakness, defect or fracture or visible signs of leakage occurring in the manhole under test, the Engineer shall have the right to order the test to be discontinued and the Contractor shall thereupon, at his own expense, search for and rectify any weakness or defect in the manhole under test, such work or rectification to consist of repair or replacement or both. The manhole shall thereafter be refilled with water and retested in the manner specified. This process shall be repeated until a satisfactory test is obtained.

The Contractor will be paid once only for the hydraulic testing of any given manhole at the rate per manhole to be quoted by him in the Schedule of Quantities. The Contractor’s prices for the hydraulic testing of manholes shall include for all arrangements for the supply of water for testing the cost of water used in testing where the water is not obtained free of

cost from the Employer for all work of rectification for retesting and fro all labour required to carry out the specified tests.

PSLD 8 MEASUREMENT AND PAYMENT

PSLD 8.2.5 Inspection Chambers

Delete the first and second lines and substitute the following:

Separate items will be scheduled for manholes, backdrops and inspection chambers, etc of each type and of each depth (measured from top of cover to invert) in increments of 1.0m for the first one metre thereafter in increments of 0.5m. The rate shall cover the cost of dealing with any excavation (in all materials, including backfilling and the disposal of surplus materials).

PSLD 8.2.6 Erf Connections

Add at end of Sub-Clause:

"or servitude boundary"

PSLD 8.2.11 Connection to Existing Sewers

The tendered sum is to include for breaking into the existing sewer manholes, dealing with the flow, caulking in the new pipe and for breaking out and reforming benching as required, making the manholes watertight.

PSLD 8.2.13 Intermediate and Hard Rock Excavation (New Sub-Clause)

Insert new Sub-Clause as follows:

8.2.13 Extra over item 'Manholes' above for

a) Intermediate excavation ……. Unit : m^3

b) Hard rock excavation by **normal blasting** or other methods as selected by the contractor (see PSLD 2.3) ……. Unit : m^3

c) Hard rock excavation by **close proximity blasting** (see PSLD 2.3) ..…… Unit : m^3

d) Boulder excavation Class A ……. Unit : m^3

Separate items will not be provided for depth increments. Volumes will be computed from the plan area of either the intermediate or hard rock material, excluding the plan area of the specified pipe trench, which is within the area occupied by the manhole plus a side allowance of 600mm and the depth from the top of either the intermediate or hard rock material to the bottom of the same material or to the underside of the Manhole base slab, whichever is the lesser.

THE RATES SHALL COVER THE ADDITIONAL COST OF THE EXCAVATION AND HANDLING OF THE MORE DIFFICULT MATERIAL AND THE DISPOSAL OF MATERIAL

PROJECT SPECIFICATION : PORTION 2

SABS 1200 PS LE : STORMWATER DRAINAGE

PS LE 3 MATERIALS

PS LE 3.1.1 Material for Subsoil Drainage

PS LE 3.1.1.1 Pipes

Pipes for subsoil drainage shall be uPVC pipes complying with the requirements of SABS 791, but shall be perforated or slotted.

The size of perforations in perforated pipes shall in all cases be 8 mm in diameter ± 1,5 mm and the number of perforations per metre shall be not less than 26 for 110 mm pipes and 52 for 160 mm pipes. Perforations shall be spaced in two rows for 110 mm pipes and in three rows for 160 mm pipes.

Slotted pipes shall have a slot width of 8 mm ± 1,5 mm. The arrangement of slots shall be subject to the Engineer's approval, but the total slot area shall be not less than that presented for perforations.

Pipes without slots or perforations required for conveying ground water from the subsoil drainage proper to the point of discharge, shall be uPVC pipes as specified above.

PS LE 3.1.1.2 Crushed-stone

Crushed-stone in subsoil drains shall be 19 mm single-sized stone complying with the grading requirements of stone for concrete in SABS 1083.

PS LE 3.1.1.3 Geotextile Blanket

The geotextile blanket around subsoil drains shall comply with the requirements of PS DK 3.1.4 in all respects.

PS LE 3.1.1.4 Sand

Sand obtained from approved commercial sources shall be clean, hard and durable and shall comply with the following grading requirements:

D15 : 0,2 mm to 0,4 mm
D85 : 1,2 mm to 4,7 mm

PS LE 5 CONSTRUCTION

PS LE 5.1 Trench Bottom

PS LE 5.1.3 Unsuitable Founding Conditions

Substitute "90 % of MAASHTO maximum density" in LE 5.1.3 with "90 % of MAASHTO maximum density (100 % for sand)".

PS LE8.2 BEDDING AND LAYING

PS LE 8.2.14 Supply And Install Subsurface Drains According To Drawings ..... Unit : m

The length shall be measured on the centre line of the completed subsurface drain.

The rate shall cover the cost of supplying, transporting, off-loading and installing all materials as well as for cutting, wasting, overlapping and installing of the materials where applicable.

PARTICULAR SPECIFICATION

PA: BRICKWORK AND PLASTER

PA1 SCOPE

PA1.1 This specification covers the general requirements for buildings and other masonry structures, including plastering.

PA2 INTERPRETATION

PA2.1 Other relevant Standards/Specification

This specification should be read together with SABS 1200 AA.

PA2.2 Applicable Edition of Standards

Each standard specification referred to in this specification shall be deemed to be the latest edition, applicable on the tender closing date.

PA2.3 Definitions and Symbols

For purposes of this specification, the definitions and symbols given in the National Building Regulations and Building Standards Act, 1977 (referred to further on in this specifications as "Building Act"), where applicable, shall apply. (Definitions: pages 5 to 14, Symbols : page 23.)

PA3 MATERIALS

PA3.1 Cement

Cement shall conform to the requirements of SABS 471.

PS3.2 Lime

Lime shall be of approved manufacture, well burnt and of uniform quality conforming with SABS 523.

PA3.3 Sand

Sand to be used for mortar and plaster shall comply with the requirements of SABS 1090.

PA3.4 Clay Bricks

Clay bricks must conform to SABS 227. A sample of bricks to be used for construction must be given to Engineer for approval before construction bricks are delivered to site.

The contractor will be required to carry out necessary tests and provide certificates for compliance of the bricks with SABS 227. The cost of these tests will be deemed part of the scheduled rates and no additional payment will be made therefore.

Best quality engineering bricks shall be used for all foundation and concealed situations.

PA3.5 Damp-Proofing

Material used as a dampproof course shall conform to the requirements contained either in SABS 248 or in SABS 952. Type FV fibre-felt sheets or Type C polyethylene sheets shall be supplied under the contract.

PA3.6 Fibre Cement Sheets

Fibre cement flat sheets, minimum 15 mm thick, shall comply with the requirements of SABS 685.

PA3.7 Storage

PA3.7.1 Cement and Lime

Cement and lime stored on the site shall be properly protected against moisture to the satisfaction of the engineer.

PA4 CONSTRUCTION

PA4.1 Brickwork

Brickwork shall be well and regularly bonded, with no false headers and none but whole bricks except where legitimately required as closers. All bricks must be thoroughly dampened before laying and each brick is to be laid with full joints and pressed into its bed so as to squeeze out superfluous mortar and give a finished joint not exceeding 8 mm thick in the case of the face work or 13 mm thick in the case of plastered walls or work not exposed to view. All joints, both horizontal and vertical, notwithstanding any grade custom to the contrary, are to be filled solid with mortar for their full width and depth, each course being flushed with mortar, worked well down into all vertical joints before the succeeding course is laid. Horizontal joints and vertical joints of face work shall be pointed flush in manholes and catchpits, but shall be pointed and finished with a tooled recessed joint elsewhere. Plastered walls shall have the joints raked out to a depth not less than 13 mm and not more than 20 mm, and subsequently refilled with mortar of the same proportions as the original bedding mortar. In no circumstances may joints to be so formed as to expose any perforation in the units.

Wire ties, where required, shall be stainless steel and are to be installed at 5 per square metre.

PA4.2 Mortar

The mix proportions for the mortar are given below:

Portland cement	50 kg
Lime	0-40 l
Sand*	200 l max.

* measured loose and damp

PA4.3 Plastering

Plaster shall be of the same proportions as the bedding mortar. Any other plaster mixes will be subject to the approval of the Engineer.

PA4.4 Dampproof Courses

The areas to be covered by dampproof courses are indicated on the drawings. Dampproof shall be laid on a surface which shall not contain any sharp objects which may perforate the

membrane. The full width of the wall and the whole area under the floor is to be covered by the membrane and shall overlap by not less than 100 mm under the floor, and by not less than 150 mm under the wall. All joints shall be effectively sealed. Where shown on the drawing, the dampproof course is to be stepped up one course of brickwork in the inner skin. Proper returns are to be made at all doorframes.

PA4.5 Window Sills

Windowsills shall be formed as shown on the drawings and as hereafter described:

Dampproof sheeting shall be provided one brick course below the sill and shall be turned upwards and terminate behind the window frame to provide an efficient weather-tight seal.

All external sills and some internal sills, where shown, shall be formed in quarry tiles and other internal sills where shown are to be of fibre cement sheet minimum thickness 15 mm to SABS 685 with approximately 20 mm projection beyond the finished face of the walls.

External sills shall be laid to a 20° weathered slope while internal sills shall be laid horizontal.

All tiles shall be bedded in 3:1 cement mortar and neatly pointed.

PA4.6 Lintels with Brickwork Reinforcement

Lintels over doors, windows and openings, where ordered by the Engineer, shall be reinforced with four layers of BRC brickforce, or approved equal. The latter reinforcement shall extend a minimum of 450 mm beyond any opening. All joints in the six courses of brickwork above the opening shall be fully flushed with cement mortar. Shoring to soffits of lintels shall be left in position for at least 14 days after building the lintel and the brickwork shall be kept damp with wet bags for the whole of this period.

PA4.7 Wall Vents

Ventilator openings shall be formed through walls where indicated and shall be provided with double brick terracotta louvred air bricks (fitted with plastic insect screens) both externally and internally (where scheduled) set flush into the work and neatly pointed. Internal wall vents are to be of an approved plaster of paris type where scheduled.

PA4.8 Building in Frames, etc

Door and window frames are to be set up, built into position, bedded and pointed in cement mortar, with any necessary cutting to brickwork, fitting and making good, as the brickwork is built up. In the case of doorframes, wrought iron right angled cramps are to be fixed to doorframes and built into brickwork at every eighth course.

Where pipes, frames, brackets or other such parts pass through or have to be set into brickwork, the bricks shall be carefully cut and fitted to maintain regularity of courses and uniformity of joints, the shaped bricks being embedded and pointed to conform with the surrounding brickwork. Where such parts have to be set into position after brickwork is built, holes shall be left wherever possible, in preference to cutting out bricks, and the work shall be subsequently made good in the manner described.

PA4.9 Floor Finishes

PA4.9.1 Granolithic Floor Screed

Granolithic shall consist of one part cement, one part sand and two parts 5 mm stone chips and oxide where required, thoroughly mixed as for concrete and placed in a layer not less than 20 mm thick, levelled or graded and trowelled to a smooth uniform surface. To ensure proper bond, the concrete surface to be covered shall be clean, roughened by chipping, flushed with water and coated with cement grout just before placing of the granolithic layer. Granolithic finish is to be steel floated with V joints in squares of 1,20 m to 1,80 m, the joints extending for the full depth of the granolithic. Joints are not required in the granolithic screed where it is to be overlaid by tiles or carpeting.

PA4.10 Chasing Walls

Where indicated by the electrical contractor, the construction contractor shall chase brickwork and concrete work to accommodate electrical conduit - such chasing shall precede plastering or rendering and on no account shall plastering or rendering be commenced until the electrical tubing has been installed. No horizontal or diagonal chases shall be permitted.

Elsewhere, electrical conduit shall either be cast into concrete or shall be run on the surface afterwards as may be directed by the Engineer.

PA4.11 Weather

In any period of interruption caused by inclement weather, and at the completion of each day's bricklaying, freshly laid brickwork should be protected.

PARTICULAR SPECIFICATION

PB: CARPENTRY, JOINERY AND IRONMONGERY WORK

PB1 SCOPE

PB1.1 This specification covers the general requirements for carpentry, joinery and ironmongery work for civil engineering projects and the methods by which the finished work is to be measured for the purpose of payment.

PB2 INTERPRETATION

PB2.1 Other Standards/Specification

This specification is to be read with SABS 1200 AA .

PB2.2 Applicable Edition of Standards

Each standard specification referred to in this specification shall be deemed to be the latest edition, at the closing date of tenders for this contract.

PB3 MATERIALS

PB3.1 Timber

Roof timber forming a permanent part of the work shall conform to the requirements of the relevant standard specifications SABS 563, SABS 653, SABS 876, SABS 1089 or SABS 1245.

All timber other than that used for temporary works or shuttering shall be treated as specified in SABS 1288 and SABS 05, and allowed to dry thoroughly before being used.

PB3.2 Fibre Cement Sheets

Fibre cement flat and corrugated sheets shall comply with the requirements of SABS 685. The flat sheets shall be minimum 15 mm thick.

PB3.3 Hardware

Locks, hinges and other hardware shall be provided to doors; all ironmongery and fixings shall be chromium plated on brass except where otherwise specified.

PB3.3.1 Hinges

Hardwood doors in hardwood frames are to be provided with brass butt hinges as scheduled with three hinges per leaf.

PB3.3.2 Door Locks and Furniture

External door to be fitted with a night latch (to be supplied by the Employer) and a Henderson No 463 bow handle, secured with brass bolts passing through the door with nuts on the inside.

PB3.3.3 Cabin Hooks

One 200 mm brass cabin hook complete with eyes to be fitted to each door including for hardwood block plugged to walls or post as scheduled.

PB4 MEASUREMENT AND PAYMENT

PB4.1 The work will be measured and paid for in accordance with the units and rates scheduled.

PB4.2 The tendered rates for doors are to include for the manufacture, fitting hanging and protective painting thereof.

PB4.3 The tendered rates for ironmongery shall include for the supplying and fitting complete with non-corrosive screws and/or bolts.

PARTICULAR SPECIFICATION

PC: PAINTING

PC1 SCOPE

PC1.1 This specification covers the general requirements for painting, including methods of preparation of materials to be painted, cleaning, priming, undercoating and finishing, and also methods by which the finished work will be measured and paid for.

PC2 INTERPRETATION

PC2.1 Supporting Specification

This specification must be read together with SABS 1200 AA

PC2.2 Applicable Edition of Standards

Each standard specification referred to in this specification shall be deemed to be the latest edition at the tender closing date.

PC3 MATERIALS

PC3.1 Emulsion Paints for Exterior Use

Emulsion paints for exterior use shall comply with SABS 634.

PC3.2 Calcium Plumbate Primer

Calcium plumbate primer shall comply with SABS 912.

PC3.3 Undercoats for Paints

Undercoats for air-drying protective and decorative paints shall comply with SABS 681.

PC3.4 Structural Steel Paints

Structural steel paints shall comply with SABS 684.

PC3.5 Colours of Paints

Specification for colours of paints shall comply with CKS 279.

PC3.6 Paints Generally

Paints shall be of the best quality and of approved manufacture. Tints shall be selected during the course of the work, and for this purpose the Contractor, before placing orders for paints, shall submit samples to the Engineer for approval as to quality and tints. All paints shall be brought on to site in unopened tins and no adulteration will be permitted.

PC4 CONSTRUCTION

PC4.1 Painting Generally

Paints must be applied strictly in accordance with the manufacturer's instructions relating to preparation of surfaces, undercoats and application.

No painting on exterior work is to be done in wet weather, or upon surfaces which are not thoroughly dry and all work is to be entirely free from dust before painting is proceeded with. All paintwork shall be properly cleaned and rubbed down between each coat. No coat shall be applied until the Engineer has passed the previous one as dry, hard and satisfactory.

All colours for paintwork and all makes and composition of paint shall first be approved by the Engineer before putting the work in hand.

All paint marks and spots on surfaces on which they are not intended shall be removed to the satisfaction of the Engineer and the work shall not be accepted until this is assiduously carried out. Where required, paintwork shall be finished to a straight line.

Painting must be carried out in co-operation with other contractors and may be allowed to proceed only at the discretion of the Engineer.

Identification colour marking shall comply with SABS 0140.

PC4.2 The Preparation of Steel Surfaces for Coating

Cleaning and preparing steel in order to produce a surface suitable for application of coatings shall comply with the methods specified in SABS 064. Grease, oil and watersoluble salts shall be removed as specified under Clause 3. Mill, scale, rust, weathered paint and most contaminants shall be removed by blast cleaning. If this method is impracticable, hand-tool cleaning shall be carried out if permitted by the Engineer.

The coating shall be applied after cleaning and after the corrosion-inhibiting wash has been used.

PC4.3 Galvanised Steel

After the surface has been properly cleaned and prepared as specified in Clause 6, SABS 064, calcium plumbate priming paint conforming to SABS 912 shall be applied, followed by finishing paint conforming to SABS 684, Type B. The priming coat shall not be allowed to weather before application of the finishing coat(s) specified in the Schedule of Quantities.

PC4.4 Painting Woodwork

The surface of the wood should be properly prepared by planing and sandpapering. Knots in the wood shall be carefully sealed by means of a shellac-based knotting solution. All woodwork shall be adequately primed. When paint coats are applied, the primer shall always be harder than the following undercoat.

The topcoat as specified in the Schedule of Quantities.

PC4.5 Painting Plastered Walls

All plastered walls are to be sealed and primed. Thereafter the walls are to be given three coats of exterior quality PVA paint, all as specified in the Schedule of Quantities.

PC4.6 Painting Concrete Surfaces

All concrete surfaces which are to be painted are to be thoroughly brushed and washed with a detergent and cold water. Thereafter the surfaces are to be primed and then painted with two coats of exterior quality PVA paint, unless otherwise specified in the Schedule of Quantities.

PC4.7 Varnishing

All hardwood is to be prepared, stopped and sealed with "007 Longlife Marine varnish" before installation. After installation and sanding down, two further finishing coats are to be applied, allowing for rubbing down between coats, all in accordance with the manufacturer's instructions.

PC5 BASIS OF MEASUREMENT AND PAYMENT FOR PAINTING

The cost of painting metalwork is to be included in the tendered prices for supply and installation. Painting to walls and ceilings will be paid for per square metre of surface painted. Other items will be paid for per linear metre or on a lump sum basis, as set out in the Schedule of Quantities.

PARTICULAR SPECIFICATION

PSP: STEEL PIPES

SCOPE

This specification covers the design, manufacture and supply of bare, electric welded low carbon steel pipes, specials and other fittings for the conveyance of water at ambient temperatures and at medium pressures.

2. INTERPRETATIONS

2.1 Supporting specifications

2.1.1 Where this specification is required for a project, the following specifications shall form part of the contract document:

(a) Project specifications;
(b) SABS 1200A and SABS 1200AA, as applicable;

2.1.2 Reference is made to the latest issues of the following standards:

DWS	1131	Lining and coating of steel pipes and specials.
SABS	1200	As given in 2.1.
SABS	62	Steel pipes and pipe fittings up to 150 mm nominal bore, suitable for screwing to
SABS	1109	pipe threads.
SABS	719	Electric welded low carbon steel pipes for aqueous fluids (ordinary duties).
SABS	974	Rubber joint rings (non-cellular).
SABS	1431	Weldable structural steels.
SABS	044	Welding.
SABS	0121	Cathodic protection of buried and submerged structures.
BS	534	Steel pipes and specials for water and sewage.
BS	2633	Class 1 arc welding of ferritic steel pipework for carrying fluids.
BS	2815	Compressed asbestos fibre jointing.
BS	4360	Weldable structural steels.
BS	4416	Method for penetration testing of welded or brazed joints in metals.
BS	4504	Flanges and bolting for pipes, valves and fittings. etric series.
BS	5500	Specification for unfired fusion welded pressure vessels.
SIS	05 59 00	Pictorial surface preparation standards for painting steel surfaces (Swedish)
API	5L	Line pipe.
API	1104	Standard for welding pipelines and related facilities.
AWWA	June 1955	Design of wye branches for steel pipe.
AWWA	M11	Steel pipe - a guide for design and installation. (Second edition)
ISO	2084	Pipeline flanges for general use

2.2 Application

This specification contains clauses that are generally applicable to the design, manufacture and supply of steel pipes, specials and fittings for duties up to 4,6 MPa. Should no other specification for pipes of outside diameter larger than 2 220 mm be included in a contract, then the requirements of this document shall apply.

2.3 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:

Skelp: The jointing edges of steel coils used to manufacture spiral welded pipes.

H: The cross-sectional shape of a weld at skelp

Cut and shut bend: See definition with sketches in BS 2633

3. MATERIALS

3.1 Pipes and specials

Materials used for the manufacture of pipes and specials of nominal bore up to 150 mm shall conform to SABS 62 and API 5L: steel grades up to X52, whilst that for pipes and specials of nominal bore over 150 mm shall conform to SABS 719: steel grades A, B and C, as well as API 5L: steel grades X46, X52, X56 and X60.

Flanges shall be manufactured from steel plates conforming to BS4360, or SABS 1431 grade 300W. Specials and fittings shall be manufactured from materials conforming to SABS 62 for nominal bores up to 150 mm, and to BS 534 for nominal bores over 150 mm.

3.2 Rubber joint rings

Rubber rings shall comply with SABS 974 Class F.

3.3 Jointing materials

Bolts, studs, nuts and washers for flanges shall be of materials conforming to the requirements of BS4504 unless otherwise specified. Gaskets for flanged joints shall be of compressed asbestos fibre to BS 2815 grade A, and full faced with a minimum thickness of 3 mm. For pressures up to and including 1,6 MPa, cloth-inserted rubber may be used.

4. PLANT

The Contractor shall supply and maintain suitable tools, plant and equipment to manufacture and supply steel pipes, specials and fittings to the required standard.

5. GENERAL REQUIREMENTS

5.1 Design of pipes

The design stress for pipes subjected to the specified design pressures shall be 60% of the minimum yield stress of the steel.

Unless otherwise specified in the Schedule of Quantities or on the drawings, the minimum pipe wall thickness to prevent buckling of straight piping due to internal sub-atmospheric pressures, shall not be less than the following:

Outside Diameter of Pipe (mm)	Minimum Wall Thickness (mm)
160 to 558,8	4.5
609,6 to 660,4	5
711,2 to 812,8	6
863,7 to 1092	8
1118 to 1245	10
1397 to 1620	12
1708 to 1860	14
2020 to 2220	16

5.2 Dimensional requirements

Unless otherwise specified in the Schedule of Quantities or on the drawings, all line pipes shall be of one fixed standard length between 9 metres and 19,5 metres. Standard pipes from which samples for destructive testing have been cut may be jointed together by butt-welding to form single pipe lengths of the required standard length.

The tolerances on all other dimensions shall be in accordance with SABS 719 clause 4.1, except that for pipe outside diameters bigger than 1 250 mm it shall be +6 mm and 6 mm. The tolerances on the outside diameters of pipe ends and bodies shall be as specified for pipe diameters of 250 mm to 1 250 mm.

5.3 Fabrication

5.3.1 Welding

Welds shall comply with SABS 719, SABS 044 and BS 2633 as modified below.

a) Sections 1, 2 are excluded.

b) Section 8

In addition to clause 8.1 the following shall also apply:

All butt-welds and branch fillet welds on specials shall where considered possible (refer clause 3.2.4.2, Section 3) have an internal weld. The weld bead of this internal weld shall not extend above the prolongation of the original inside surface of the pipe by more than 1,0 mm. Internal reinforcement in the form of backing rings at weld seams shall not be permitted.

c) Section 10

Procedure qualification and qualifying tests shall be restricted to branch connections only.

The internal weld bead/upset metal and flash on the inner surface shall not exceed 1 mm. For pipes and specials to be jointed by butt welding, the internal weld bead shall not protrude more than 1 mm into the bore of the pipe or special. For electric resistance welded pipes, the height of upset metal and flash on the inner surface shall not exceed 1 mm. For pipes and specials to be jointed by butt welding, the internal weld bead shall be ground flush with the pipe body for a length of 200 mm from the ends to be jointed. For pipes and specials to be coupled by flexible couplings, external weld reinforcement or upset metal and flash shall be ground flush with the pipe body for a length of 200 mm from the end to be coupled.

Where automatic submerged-are welding is employed, at least one pass shall be made on the inside and at least one pass on the outside. This shall apply for double jointing of pipes in the factory as well. The number of longitudinal weld seams shall not exceed:

i) for pipes up to 1 000 mm nominal diameter;

ii) for pipes larger than 1 000 mm and up to 2 220 mm nominal diameter.

For pipes to be jointed by flexible couplings the pipe manufacture is required to weld steel plates not less than 50 mm x 75 mm x 6 mm thick to each end of all pipes during the pipe manufacturing process, (i.e. before priming, lining and coating).

All manual or semi-automatic welds and repair welds shall only be undertaken by welders qualified under the tests laid down in the Code of Practice for Welding SABS 044.

5.3.2 Pipes

Pipes shall be manufactured in conformity with SABS 719.

5.3.3 Specials and fittings

5.3.3.1 General

All specials and fittings shall be designed and manufactured by the Contractor in accordance with the general arrangement shown on the drawings and/or described in the Schedule of Quantities, in conformity with SABS 62 or sections 3 and 4 of BS534. In the latter case specials shall be manipulated or fabricated by welding from pipes which have been tested to SABS 719. Detailed drawings shall be approved by the Engineer.

5.3.3.2 Bends

Bends shall either be smooth formed or segmented. The maximum angle between oblique butt-ends of segments for gussetted bends shall not exceed 22£ degrees. Cut-and-shut bends shall not be permitted. Segmented bends shall be classified as short, medium and long with radii equal to one, two or three diameters respectively. All bends shall however be of a long radii type, unless otherwise specified in the Schedule of Quantities or on the drawings.

5.3.3.3 Branch connections

Branch connections shall have barrel and branch plate thicknesses such that the maximum stress shall not be greater than that for an uncut pipe of the theoretically required minimum thickness. However, where it is more economical to provide external reinforcement in the form of saddle-type rings or triform shoes, these forms of reinforcement shall be used to achieve the same results. The attachment of reinforcement to the pipe branches shall be by full penetration welding. Branch connections shall be as remote as possible from the seam weld on the barrel, and except where specifically indicated to the contrary on the drawings, the positioning and extent of external reinforcement is to be determined by the following methods:

(i) Saddle-type reinforcement: section 13.3 of AWWA Manual M11.

(ii) Triform-shoe reinforcement: in accordance with "Design of Wye Branches for Steel Pipe" by H.S. Swanson and co-authors, published in the Journal of the AWWA, June 1955.

Scour valve tees are to be at right angles to the barrel of the pipe, but tangential to the circumference at the invert of the pipe. The flanges are to be aligned to suit the gradient of the pipeline as indicated on the drawings.

Unless otherwise specified complete flanged air valve and access branches shall be supplied loose with the one end profiled and prepared for welding to the pipe or special. Branches are to be prealigned to suit the pipeline gradient as indicated on the drawings.

5.3.3.4 Reducers

Taper pieces shall not have more than two longitudinal weld seams.

5.3.3.5 Flexible couplings

Flexible couplings shall be of the Viking-Johnson type with centre register, except where specified to the contrary in the Schedule of Quantities or on the drawings. Flexible couplings shall be supplied complete with all necessary bolts, nuts and rubber jointing rings.

5.3.3.6 Insulated joints

Insulated joints shall have their insulation material arranged as given in SABS 0121, unless otherwise specified.

5.3.3.7 Flanges

Flanges shall be of the steel-plate for welding type and shall have flat joint faces, with dimensions and joint surfaces in accordance with BS 4504 or ISO 2084, unless otherwise specified in the Schedule of Quantities or on the drawings. For flange thickness not covered in BS 4504 and for domed and conical ends the various thicknesses and methods shall be calculated in accordance with section 3 and where applicable manufactured in accordance with the remainder of BS 5500. Back surfaces may be left unmachined. All flanges shall be suitable for field welding to pipes and specials and shall conform to BS 2633, section 7, with preparation of plate flanges as shown in figure 41 ("slip-on") for pipes and specials up to 100 mm N.B. and figure 39 or 40 ("bore and fillet") for pipes and specials 125 mm N.B. and larger. Unless otherwise specified, jointing material i.e. bolts, nuts and washers, in conformity with BS4504 shall be supplied by others.

6. MARKING OF PIPES AND SPECIALS

All pipes and specials shall be clearly hard stamped alongside a longitudinal or spiral weld on one end of the pipe with the following:

(a) grade and thickness of steel;

(b) serial number of the pipe or specials;

(c) nominal diameter;

(d) hydraulic test pressure.

The applicable drilling table shall be stamped on the periphery of all flanges. Bends shall have their centre plane marked with two small punch marks close to both ends to facilitate correct positioning in laying.

7. STORAGE, HANDLING AND TRANSPORT

Pipes and specials shall be protected against damage at all stages from manufacture to delivery. The ends of all pipes and specials shall be protected against denting. Pipes shall be transported and stacked in a manner such as to prevent deformation of the pipe body in excess of 2 percent of the diameter. Dents causing a protrusion in excess of 3 mm into the interior of the pipe shall be repaired by cutting out. The Contractor shall be responsible for dispatching and transporting of the pipes to site and off-loading. Suitable access along the pipeline route will be provided unless otherwise specified.

Access for delivery on site might be restricted by poor weather conditions and the Contractor shall make due allowance for such disruption. Unless otherwise specified the pipes shall be off-loaded adjacent to the laying position, and placed on sandbags or other approved protective supports.

As indicated on the drawings, the Contractor shall stack the pipes, specials and fittings at the top or bottom of very steep inclines from where the pipeline construction Contractor will transport them to their destination as required. He will furthermore provide in the rates for his delivery trucks to be hauled/towed up the steep inclines along the pipeline route where necessary.

8. INSPECTION AND METHODS OF TEST

8.1 General

Factory inspection, supervision of tests, and adjudication of test records shall be carried out by an independent Inspectorate appointed by the Employer to act on behalf of the Engineer. Tests and inspections shall be carried out at the manufacturer's works at his expense. He shall provide all necessary testing facilities, labour, instruments, equipment and samples that might be required, free of charge. The Inspectorate shall be afforded every facility during the course of manufacture and testing to enable the inspection to be carried out effectively. All test samples shall be selected by the appointed inspectors, and all instruments used for testing purposes shall be approved by the inspectors and if in their opinion any instrument should require calibration, such instruments shall be calibrated at the expense of the Contractor, by the SABS or other such body as may be approved by the Inspectorate. No mechanical working or straining of pipes and specials shall be allowed after testing and inspection.

8.2 Non-destructive inspection

8.2.1 Visual inspection

All finished pipes and specials shall be visually examined and shall be free of injurious defects as defined in API 5L section 10.7. In addition welds on specials shall be inspected by the application of a penetrant-dye on the inside of the welds. No trace of the dye should appear on the outside.

8.2.2 Ultrasonic inspection to API 5L

Pipes shall be made by an approved welding process and 100 percent of all longitudinal or spiral welds on straight pipes shall be checked with an approved ultrasonic method capable of continuous and uninterrupted inspection of the weld seam in accordance with API 5L, sections 9.14, 9.15, 9.16, and 9.17, except that the equipment shall be checked with an applicable reference standard at least twice every working turn.

8.2.3 Radiographic inspection to API 1104

(a) Longitudinal welds: All electric fusion welded pipes shall be inspected by radiological methods for a distance of 200 mm from each pipe end.

(b) Spiral welds: All electric fusion welded pipes shall be inspected by adiological methods for a distance of 100 mm from each end of each length of pipe and of the complete "H" at all skelp and welds, including 150 mm of the spiral welds in both directions away from the intersection points of the skelp and welds.

(c) Circumferential butt welds and welds on specials: 100 percent of the weld length shall be examined. When consistently acceptable results are obtained, the number of welds to be so tested may be reduced by mutual agreement between the Engineer, Inspectorate and Contractor.

(d) Repairs

(i) Straight piping - 100 percent of the total length of all repairs shall be examined radiographically. Where repairs are made before ultrasonic inspection, and such repairs pass ultrasonic inspection, no further radiographic inspection of same is required.

(ii) Specials - 100 percent of all repairs shall be examined radiographically.

(e) Pipes for rail, road and river crossings: 100 percent of the total length of all welds shall be examined radiographically.

8.2.4 Hydrostatic testing

All pipes shall be hydrostatically tested to a pressure such as to produce a circumferential tensile stress in the steel not less than 90 percent of the minimum yield stress of the steel, or 9 MPa, whichever is the lesser. Each individual straight pipe shall be subjected to a hydrostatic test in accordance with the methods described in API 5L section 5. Leaks or sweats shall be considered injurious defects. Should it not be possible to hydrostatically test straight piping and/or specials, a liquid penetrant test shall be done on all welds over and above the non-destructive tests specified above. This will only be applicable with the prior written approval of the Engineer.

8.2.5 Liquid penetrant testing

Where requested by the Inspectorate, liquid penetrant testing shall be done in accordance with BS 4416.

8.2.6 Magnetic particle testing

Where requested by the Inspectorate, magnetic particle testing shall be done in accordance with ASME Boiler and Pressure Vessel Code, Section V, Article 7.

8.3 Repair of injurious defects

Injurious defects found by non-destructive testing of welds, visual examination, hydrostatic testing or determined by any other means to exceed the limitations in API 5L section 10.7 shall be repaired in accordance with API 5L sections 10.8 and 10.9, but subject always to the requirements of this specification.

8.4 Destructive testing

8.4.1 Tests

Destructive tests shall be performed in accordance with SABS 719 clause 7.2 on the first pipe and thereafter on one of every 500 subsequent pipes.

8.4.2 Sampling and compliance with the Specification.

This shall be performed in accordance with SABS 719 clause 6.

9. MEASUREMENT AND PAYMENT

Measurement and payment shall be per linear metre of straight pipe fabricated, supplied and delivered to site. Measurement and payment of specials and fittings shall be per the number of each special and fitting fabricated, supplied and delivered to site. Where pipe linings and coatings are applied prior to delivery, the rates for pipes, specials and fittings shall include for all such linings and coatings as required under Departmental Specification DWS 1131, unless otherwise specified in the Schedule of Quantities.

PARTICULAR SPECIFICATION

PD: VALVES

PD 1 GATE VALVES

Gate Valves shall bear the official mark of SABS and be SABS approved. They shall comply with SABS 664 for waterworks pattern valves of the types, classes and sizes listed in the Schedule of Quantities and shall be provided with the following :

	Description	Specification
1	Flanges	Double flanged, to be in accordance with and drilled off-centre to SABS 1123, Table 1600, 2500 or 4000 as scheduled.
2	Spindles	Non rising, bronze or stainless steel with spindle nut either bronze or gunmetal
3	Handwheels	Direction of rotation for opening valves shall be clockwise when viewed from the top and appropriate wording must be embossed at the top indicating direction of “close” and “open” with arrow heads
4	Tests	Valves to be subjected to “closed end” and “open end” pressure tests to one and half times the working pressure. Valve body shall be tested to twice working pressure. Under all the tests, no leakage to occur
5	Paint	As in PD4
6	Other	• Type B gunmetal trim • Valves should permit repacking of the gland whilst valve is under pressure • Factory test certificates to be provided with each valve • Rates in the schedule of quantities to include requirements to comply with specification

PD 2 REFLUX VALVES

Reflux valves shall, except where otherwise specified, be double flanged single door swing type and shall be fitted with gun metal seats and bronze hinge and clack pins. In the case of reflux valves to be mounted horizontally, the design shall be such that the gate rests against the seat in the absence of flow or of differential pressure, without the aid of springs or external counterweights. Reflux valves shall comply with the requirements of SABS 144 for working pressures as required for each application, but not less than 1600 kPa working pressure.

PD 3 AIR VALVES

PD 3.1 General

The materials and workmanship employed in the manufacture of air valves shall be of a similar standard to that set out in SABS 664 for waterworks pattern gate valves and they shall be provided with individual test certificates for each valve from the manufacturer; all valves are to be inspected, and the hydraulic tests witnessed, by an Inspector to be appointed by the Engineer, and the tendered rates for the valves shall include for making arrangements for independent inspections. The Inspectors' fee and recoverable expenses will be for the account of the Employer, fees and expenses arising from abortive or repeat visits due to non-compliance with the specified requirements will be for the Contractor's account and will be deducted from amounts due to the Contractor.

PD 3.2 Types of Air Valves

Air Valves shall be standard types (epoxy coated flanges; stainless steel sleeve, bolts, nuts, studs etc), of the double orifice type, and shall be equal or similar to the "Vent-O-Mat" (RBX series: 50 mm dia valves: 050 RBXc2511; 80 mm valves: 080 RBXc1601) type in which a small orifice, manufactured from Grade 316 stainless steel and having a minimum orifice size of 2,0 mm

diameter, shall be capable of releasing accumulations of air at all pressures throughout the specified working pressure range and shall be drop-tight at 0,5 Bar. The large orifice shall be suitable for admitting or expelling large quantities of air during emptying and filling of the pipeline. The opening of the valve (to atmosphere) shall be enclosed by a stainless steel mesh which has been fixed into the valve body to prevent the entry of small insects or vermin into the valve.

All welding of stainless steel shall be carried out in workshops dedicated to the fabrication of stainless steel products. Care shall be taken that the correct welding rods and approved welding procedures have been used for each application, and the Engineer shall have the right to request a certificate from the manufacturer in which the weld procedures used for the manufacture of valves supplied are stated.

All welds and weld beads, internal and external, shall be smoothed down by grinding and buffing. All stainless steel shall be pickled and passivated before the valve is assembled and tested.

PD 3.3 Testing

Each air valve is to be subjected to the following tests at the factory :

(a) First, fill the valve with water and apply the factory test pressure through the inlet of the valve. Under this condition there shall be no weeping from any part of the valve.

(b) Second, drain the valve and refill the valve with water and apply the maximum working pressure through the inlet of the valve and maintain for at least five minutes. Under this condition there shall be no loss of water from the valve.

(c) Third, gradually reduce the pressure applied under (b) above to atmospheric pressure, empty the valve and refill slowly expelling the air through the valve until it is full of water. Raise the pressure to the minimum working pressure, maintain that pressure for at least five minutes and again there shall be no loss of water from the valve.

(d) Fourth, maintain the minimum working pressure applied in (c) above, isolate the water inlet and introduce small amounts of compressed air into the valve without lowering the pressure in the valve. The lower float shall drop away from the upper float when sufficient air has accumulated in the valve. As soon as the accumulated air in the valve has discharged through the small orifice, the valve shall again close to a watertight condition. This process shall be repeated for at least five different pressures which are equally spaced between the specified minimum and maximum operating pressures, and the valve shall close automatically when all the air has escaped without any dribbling and shall have a drop-tight shut-off.

PD 3.4 Table of Particular Requirements for Air Valves

Scheduled Items			
Nominal diameter (mm)	80	80	25/50
Class	40	25	16
Flange Size and Rating	SABS 1123 Table 4000	SABS 1123 Table 2500	SABS 1123 Table 1600
Flange Drilling	SABS 1123 Table 4000	SABS 1123 Table 2500	SABS 1123 Table 1600
Factory Test Pressure (metres head of water)	800	500	320
Field Test Pressure (metres head of water)	as for pipeline	as for pipeline	as for pipeline
Working Pressure (metres head of water) :			
(a) Maximum	400	250	160
(b) Minimum	10	10	10

PD 4 PAINTING OF VALVES

PD 4.1 The cleaning and painting of valves as specified hereunder is to be carried out at the factory prior to despatch to site.

PD 4.2 All cast iron surfaces of every valve shall be prepared for painting to a thoroughly clean condition free of all grease and deleterious matter. Steel surfaces shall be prepared in accordance with Swedish Standard SIS 05 5900 for a Sa 2.5 finish.

PD 4.3 Internal surfaces shall then be treated with two coats of Copon Hicote 151E or other approved non-toxic epoxy resin paint to give a total minimum dry film thickness of 160 micrometres; both coats being applied within 48 hours of commencement of painting.

PD 4.4 External surfaces shall, immediately after cleaning, be treated with one of the following alternative paint systems :

(a) System 1 - for valves situated in underground chambers or exposed conditions.

Apply three coats of an approved epoxy coal tar paint to give a minimum total dry film thickness of 240 micrometres; all three coats being applied within 72 hours of commencing the first coat.

(b) System 2 - for valves situated in pump stations etc.

Apply one coat of zinc chromate primer followed by one coat of undercoat tinted where necessary, and a final coat of best quality gloss enamel. The total dry film thickness of the system shall be not less than 200 micrometres.

PD 4.5 Non-ferrous metal or stainless steel surfaces shall not be painted.

PD 4.6 After erection on site all valves shall be cleaned and the paint work refurbished where necessary to restore the condition to that at the time of leaving the factory.

PD 5 PAYMENT

The prices quoted for all valves are to include for independent factory testing of valves, which test will be witnessed by Inspectors appointed by the Engineer.

PARTICULAR SPECIFICATION

PZ: ENVIRONMENTAL SPECIFICATION

EMPLOYER'S ENVIRONMENTAL MANAGEMENT SPECIFICATION FOR ENVIRONMENTAL MANAGEMENT OF CONSTRUCTION PROJECTS

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PZ EMPLOYER'S ENVIRONMENTAL MANAGEMENT SPECIFICATION FOR ENVIRONMENTAL MANAGEMENT OF CONSTRUCTION PROJECTS

PZ1 INTRODUCTION

PZ1.1 SCOPE

This specification is additional to the South African Bureau of Standards Standardised Specification for Civil Engineering Contracts and must be read in conjunction with the said specification.

This specification covers the principles, responsibilities and requirements generally applicable to implement effective environmental management during the execution of any construction contract. The aim of this specification is to ensure that construction activities are conducted in an environmentally and socially responsible manner.

PZ1.2 INTERPRETATIONS

This specification contains clauses that are generally applicable to the implementation of effective environmental management on construction contracts. Interpretations of, and variations to, this specification are set out in the project specification.

PZ1.2.1 Supporting specifications:

Reference is made to the SABS 1200 standards which are to be read in conjunction with this specification. All aspects of these SABS requirements which are relevant to environmental management during construction contracts will apply.

PZ1.2.2 Principles

The following principles should be considered at all times during construction phase activities:

- The Environment is considered to be composed of both biophysical and social components.
- Construction is a disruptive activity and all due consideration must be given to the environment, particularly the social environment, during the execution of a project to minimise the impact on affected parties.
- Minimisation of areas disturbed by construction activities will minimise many of the construction related environmental impacts of the project and reduce rehabilitation requirements and costs.
- As minimum requirements, all relevant standards relating to international, national, provincial and local legislation, as applicable, shall be adhered to. This includes requirements relating to waste emissions (e.g. hazardous, airborne, liquid and solid), waste disposal practices, noise regulations, road traffic ordinance etc.
- All effort should be made to minimise, reclaim or recycle ‘waste’ material.

PZ1.3 DEFINITIONS

For the purpose of this specification, the definitions given in SABS 1200 shall apply.

Additional definitions which shall apply to this specification are as follows:

Environmental Control Officer: Either an Employer’s staff member or an Environmental Consultant assigned to the project on a part or full-time basis. The Environmental Control Officer will be part of the Project staff and will advise the Engineer on all environmental matters relating to the works, in terms of this specification and the project specification, if applicable.

Environmental Officer: Either an Employer's employee (e.g. Quality Assurance Inspector) or Consultant designated to monitor the implementation and compliance with the environmental specifications and environmental management plan on a daily basis.

Cleared surface: "surface vegetation" as referred to in SABS 1200 C 2.3 will be deemed to be any woody or herbaceous vegetation but exclude grasses, sedges, rushes and reeds. Clearing and grubbing shall for the purpose of this specification mean the removal of all woody and herbaceous vegetation including stumps, but excluding grass and groundcover vegetation.

Engineer: Is to read Engineer or Supervisor (in the case of the NEC contract), whichever is applicable to the Contract.

Interested and Affected Parties (IAP): All persons who may be affected by the project either directly or indirectly, or who have an interest or stake in the area to be affected by the project. IAPs include landowners, tribal or local authorities, public interest groups etc.

Liquid Waste Stream: Any reagent solutions, fuels, oils, greases, contaminated run-off, sewerage and wash water, etc.

Open Trench: Open trench will, for the purpose of this specification, be deemed to include: clearing and grubbing; stripping of topsoil; trenching; placing of bedding; pipe-laying; placing of selected fill; backfilling to ground level; removing excess material; construction of cross berms to channel water (if required); and replacement of topsoil to final finished level (refer to Figure 1: Appendix A).

Progressive Reinstatement: Reinstatement of disturbed areas to topsoil profile on an ongoing basis, immediately after selected construction activities (e.g. backfilling of a trench) are completed. This allows for passive rehabilitation (i.e. natural recolonisation by vegetation) to commence. See also 'Open Trench' and 'Rehabilitation'.

Project Manager: The person responsible for co-ordinating and integrating activities across multiple, functional lines.

Rehabilitation: Rehabilitation is defined as the return of a disturbed area to a state which approximates the state (where possible) which it was before disruption. Rehabilitation for the purposes of this specification is aimed at post-reinstatement revegetation of a disturbed area and the ensurance of a stable land surface. Revegetation should aim to accelerate the natural succession processes so that the plant community develops in the desired way, i.e. promote rapid vegetation establishment.

Riparian vegetation: Vegetation occurring on the banks of a river or stream (i.e. vegetation fringing a water body). In this specification, riparian vegetation in terms of removal, storage and replacement (see PZ3 17.1 and PZ3 17.2), is only applied to sedge, grass, ground-cover, reed, bulrush, or herbaceous component of riparian vegetation and excludes the woody component.

Sedges: Grass-like plants growing in wetland/ marshy areas or adjacent to water.

Subsoil: Subsoil is the soil horizons between the topsoil horizon and the underlying parent rock. Subsoil often has more clay-like material than the topsoil. Subsoil is of less value to plants, in terms of nutrient (food) and oxygen supply, than topsoil. When subsoil is exposed it tends to erode fairly easily.

Timeous: At least 5 working days prior to an activity.

Topsoil: This is defined as the A horizon of the soil profile. Topsoil is the upper layer of soil from which plants obtain their nutrients for growth. It is often darker in colour, due to the organic (humic) fraction. Topsoil is deemed for the purposes of this specification as the layer of soil from the surface to the specified depth required for excavation (see PZ3 5.3, relevant

SABS 1200 clause and project specification). Where topsoil is referred to, it is deemed to be both the soil and grass / ground cover fraction. (see 'Cleared Surface')
Veld: This is defined for the purpose of this specification as unimproved natural vegetation areas (e.g. grasslands).

Water body: Any open body of water including streams, dams, rivers, lakes, and the sea.

Wetland: A seasonally, temporally, or permanently wet area which also may exhibit a specific vegetation community. It is often marshy in character.

Wetland Vegetation: Vegetation which is indicative of a wetland environment - for example, sedges, rushes, reeds, hydrophilic grasses and ground-covers, but for the purposes of this specification excludes woody species.

Xeriscaping: Landscaping with vegetation which has a low water usage. The objective is to conserve as much water as possible, whilst still beautifying an area (i.e. conservation and aesthetics). Concept embraces utilising indigenous as opposed to exotic plants.

PZ1.4 ABBREVIATIONS

DWAF : Department of Water Affairs and Forestry
ECO : Environmental Control Officer
EMP : Environmental Management Plan
EMPR : Environmental Management Programme Report
EO : Environmental Officer
IAPs : Interested and Affected Parties
IEM : Integrated Environmental Management
MSDS : Material Safety Data Sheet
NEC : New Engineer Contract or The Engineering and Construction Contract

⚐ : Indicates the project specification must be referred to, to clarify the clause.

PZ1.5 DRAWINGS

Drawings referred to in this specification are included in C4.4 Drawings of Section C4 Site Information.

PZ1.6 FORMS

Forms referred to in this specification are included in Part T2 or attached to this environmental specification.

PZ1.7 CONDITIONS OF CONTRACT

PZ1.7.1 Duties and Powers of the Project Manager

The Project Manager is ultimately responsible for ensuring compliance with the environmental specification and upholding the Employer's Environmental Policy on a project.

The Project Manager:

- arranges information meetings for or consults with IAPs about the impending construction activities;
- may on the recommendation of the Engineer and /or Environmental Officer order the Contractor to suspend any or all works on site if the Contractor or his SubContractor/ supplier fails to comply with the said specifications;
- maintains a register of complaints and queries by members of the public at the site office as per attached pro-forma. This register is forwarded to the Environmental Control Officer on a monthly basis.

PZ1.7.2 Duties and Powers of the Engineer / Supervisor (NEC)

The Engineer or Supervisor is responsible for:

- enforcing the environmental specification on site;
- monitoring compliance with the requirements of the specification;
- assessing the Contractor's environmental performance in consultation with the Environmental Officer from which a brief monthly statement of environmental performance is drawn up for record purposes;
- documenting, in conjunction with the Contractor, the state of the site prior to construction activities commencing. This documentation will be in the form of photographs or video record.

PZ1.7.3 Duties and Powers of the Environmental Control Officer

The Environmental Control Officer:

- briefs the Contractor about the requirements of the Environmental Specification and/ or Environmental Management Plan, as applicable;
- advises the Project Manager and Engineer/ Supervisor about the interpretation, implementation and enforcement of the Environmental Specification and other related environmental matters;
- attends site meetings, as necessary;
- monitors the Constructor's compliance with this specification and the project environmental specification as applicable;
- undertakes periodic audits of the effectiveness of the environmental specifications on the site;
- communicates environmental policy issues to the Project Manager;
- provides technical advice relating to environmental issues to the Engineer/ Supervisor and Project Manager;
- reports on the performance of the project, in terms of environmental compliance.

PZ1.7.4 Duties and Powers of the Environmental Officer

The Environmental Officer:

- attends site meetings;
- monitors the site for compliance with the Environmental Specification and EMP;
- reports on the performance of the project in terms of environmental compliance to the ECO and Project Manager as per the pro-forma attached;
- liaises with the ECO on matters of policy and those requiring clarity and advice.

PZ1.7.5 Extent of the Contractor's Obligations

The Contractor is required to:

- provide information on previous environmental management experience and company environmental policy;
- supply method statements for all activities requiring special attention as specified and/or requested by the Project Manager, Environmental (Control) Officer and/or Engineer during the duration of the Contract;

- be conversant with the requirements of this environmental specification and the project specification as applicable;
- brief his staff about the requirements of the environmental specification;
- comply with requirements of the Environmental (Control) Officer in terms of this specification and the project specification, as applicable, within the time period specified;
- ensure any sub-Contractors/ suppliers who are utilised within the context of the contract comply with the environmental requirements of the Employer, in terms of the specifications. The Contractor will be held responsible for non-compliance on their behalf;
- bear the cost of any delays, with no extension of time granted, should he or his Sub-Contractors/ Suppliers contravene the said specifications such that the Engineer orders a suspension of work. The suspension will be enforced until such time as the offending party(ies), procedure, or equipment is corrected;
- bear the costs of any damages/ compensation resulting from non-adherence to the said specifications or written site instructions;
- comply with all applicable legislation in terms of 7.6 below;
- ensure that he informs the engineer timeously of any foreseeable activities which will require input from the Environmental (Control) Officer.

The Contractor will conduct all activities in a manner that minimises disturbance to directly affected residents and the public in general, and foreseeable impacts on the environment.

PZ1.7.6 Compliance with Applicable Laws

The supreme law of the land is “The Constitution of the Republic of South Africa”, which states:

“Every person shall have the right to an environment which is not detrimental to his or her health or well being”

Laws applicable to protection of the environment in terms of Environmental Management (and relating to construction activities) include but are not restricted to:
Animals Protection Act, Act No 71 of 1962
Atmospheric Pollution Prevention Act, No 45 of 1965
Conservation of Agricultural Resources Act, No 43 of 1983
Environmental Conservation Act, No 73 of 1989
Environmental Planning Act, Act No 88 of 1967
Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, No 36 of 1947
Forest Act, No 122 of 1984
Forest and Veld Conservation Act, Act No 13 of 1941
Hazardous Substances Act, No 15 of 1973
Lake Areas Development Act No 34 of 1975
Land Survey Act, No 9 of 1921
Minerals Act, No 50 of 1991
Mountain Catchment Act, No 63 of 1970
National Monuments Act, No 28 of 1969
National Parks Act, No 57 of 1976
National Resources Development Act, Act no 51 of 1947
Occupational Health and Safety Act, No 85 of 1993
Provincial and Local Government Ordinances and Bylaws
Soil Conservation Act, Act No 76 of 1969
Water Act, No 54 of 1956
Water Services Act No 108 of 1997
and all regulations framed thereunder and amendments there to.

PZ1.7.7 Compliance with the Environmental Specification

The Contractor is deemed not to have complied with the Environmental Specification if:

- within the boundaries of the site, site extensions and haul/ access roads there is evidence of contravention of clauses;
- if environmental damage ensues due to negligence;
- the Contractor fails to comply with corrective or other instructions issued by the Project Manager or Engineer within a specified time,
- the Contractor fails to respond adequately to complaints from the public.

Application of a penalty clause will apply for incidents of non-compliance. The penalty imposed will be per incident. Unless stated otherwise in the project specification, the penalties imposed per incident or violation will be:

Failure to demarcate working servitudes	R1000
Working outside of the demarcated servitude	R2000
Failure to strip topsoil with intact vegetation	R1000
Failure to stockpile topsoil correctly	R500
Failure to stockpile materials in designated areas	R500
Pollution of water bodies (including increased suspended solid loads)	R1000
Failure to control stormwater runoff	R1000
Failure to provide adequate sanitation	R500
Unauthorised removal of woody vegetation	R2000
Failure to erect temporary fences	R500
Failure to provide adequate waste disposal facilities and services	R500
Failure to reinstate disturbed areas within the specified time-frame	R3000
Failure to rehabilitate disturbed areas within the specified time-frame	R3000
Any other contravention of the project specific specification	R400
Any other contravention of the particular (general) environmental specification	R300

PZ2 SITE ESTABLISHMENT AND HOUSEKEEPING

PZ2.1 LAYOUT

The Contractor will take into account any of the limitations identified in the project specification with regard to establishment of site, in particular the location of access routes, and establishment layout.

Notwithstanding the provision of a project specification, the Contractor will provide the Project Manager and Environmental Control Officer with a layout design of the site indicating the position of all of the following, as applicable: offices, ablution facilities, storage areas, workshops, laboratories, batching plant, particulate matter stockpile area (i.e. soil/ granular chemicals/ cement fines etc), waste disposal facilities, hazardous substances storage area, access routes, etc. This layout plan is to be submitted prior to site establishment for acceptance. Any changes to this plan require review by the Project Manager in conjunction with the ECO.

The Contractor will take into account prevailing wind directions when designing the site layout to minimise impacts due to dust, unpleasant odours etc.

The Contractor will take into account the positions of residences when designing the site layout in order to minimise noise impacts on the residents.

Site security lighting is to be positioned such that the direct beam is focused away from residential properties and does not pose a nuisance or danger to road users.

No site establishment will be allowed within 100 m of a water body or drainage channel or on a flood plain unless approved by the Environmental (Control) Officer or specified in the project specification.

PZ2.2 SITE CLEARANCE

No trees or shrubs may be removed without the prior permission of the Environmental Officer, unless in keeping with the final site reinstatement and rehabilitation plan.
Topsoil is to be stripped from all areas where permanent or temporary structures and access roads are to be constructed. Topsoil conservation is to be in terms of clause PZ3 5.3 of this document.

PZ2.3 SERVICES

PZ2.3.1 Sanitation

Portable chemical toilets are to be utilised at site unless a connection to sewer is possible or a proper septic tank system is installed. In the case of the septic tank, the installation will require the relevant approvals from the local authority and will require removal upon completion of the contract, unless otherwise directed.

Sanitation facilities will be located within 100 m from any point of work, but not closer than 50 m to a water body.

PZ2.3.2 Solid Waste Facilities

Facilities for solid waste collection are to be provided. These are to be at least a 200 l drum and clearly identified as the point for waste disposal.

Waste is to be separated into paper, glass and metal with separate collection points for each. The Contractor will ensure that the appropriate recycling Contractors receive this waste.

The Contractor is to institute a daily litter collection programme. The collected waste is to be disposed of regularly and proportionately to its generation at a site designated for waste disposal.

No burning will be permitted on any site unless by approved incineration methods and in a low risk fire area. In the case of incineration, ash is to be co-disposed with spoil in a designated spoil dump.

No burying of waste will be allowed on any site.

PZ2.3.3 Cooking and Heating Facilities

No open fires will be allowed anywhere on site.

Contained fires (i.e. in a fire drum) will be allowed for heating and cooking only in designated areas, in other cases cooking is restricted to gas or electrical equipment.

PZ2.4 FUELS, HAZARDOUS SUBSTANCES AND OTHER LIQUID POLLUTANTS

PZ2.4.1 Storage and handling

All potentially hazardous raw and waste materials are to be handled by trained staff and stored on site in accordance with manufacturer’s instructions and relevant legal requirements. The product MSDS is to be lodged with the Engineer.

Storage and handling areas for fuels, lubricants, chemicals and other hazardous substances are to be paved with concrete to prevent accidental contamination of the soil. Alternatively, an impermeable liner may be placed beneath above-ground storage tanks. The integrity of the liner is to remain intact for the duration of the contract, until removal.

Open storage vessels, for example shutter lubricant drums, are to be stored under cover to prevent 'splash' contamination.

All storage areas are to be bunded (with at least sandbags) and have a peripheral collection drain, with oil interceptors (if required).

The bunded area is to be sufficiently large to contain a spillage equivalent to the volume of one container of the substances stored.

All products to be dispensed from 200 litre drums will be done so with appropriate equipment, and not dispensed by tipping of the drum.

Daily checks are to be conducted on the dispensing mechanism of above-ground storage tanks to ensure the timeous identification of faults.

Collection containers (e.g. drip trays) are to be placed under all dispensing mechanisms of hydrocarbon or hazardous liquid substances to ensure contamination from leaks and dispensing is contained.

The dispensing mechanism of diesel and petrol storage tanks is to be stored in a container when not in use.

PZ2.4.2 Control of pollutants

A drainage diversion system is to be installed to divert runoff from areas of potential pollution, e.g. batching area, vehicle maintenance area, work shops, chemical and fuel stores, etc if applicable.

Contaminated runoff and waste water is to be directed into a collection system (e.g. sump, attenuation dam, PVC porta-ponds etc.) for treatment or collection and disposal. The final collection point (e.g. sump) is to be PVC lined.

Collected contaminated runoff/ wastewater is to be pumped out of the final collection point and disposed of at an appropriate landfill site. Sump liners are to be treated in the same manner.

The treated waste water, effluent and contaminated runoff may require analysis prior to discharge as detailed in the project specification or instructed by the Environmental Officer. Details regarding proposed methods for treatment of pollutants are to be submitted to the Environmental (Control) Officer for acceptance upon award of the Contract.

Any spillages, irrespective of their size, are to be contained and cleaned up immediately. The Pollution Control section may provide technical assistance for clean up, if required. No spills may be hosed down into a stormwater drain or sewer.

Use of specialised cleanup techniques and/ or products may be required depending on the spill. This will be instructed by the Environmental Control Officer. These will be to the Contractor's cost.

PZ2.5 GENERAL

Site staff are not permitted to use any open water body or other natural water source (e.g. springs) for purposes of bathing, or the washing of clothes, machinery or vehicles. Nor draw water from a spring without the permission of the community utilising that spring.

PZ2.6 MEASUREMENT AND PAYMENT

Measurement and payment for compliance with clauses PZ2.1 to 5 of the specification are deemed to be fully included in the Contractor's rates for fixed and time related Preliminary and General Items scheduled under SABS 1200 A or AA.

PZ3 CONSTRUCTION

PZ3.1 CONSTRUCTION METHODS AND PROGRAMME

PZ3.1.1 Construction Method

The Contractor will provide method statements for construction activities (14 working days prior to the activity commencing) relating to the following environments and those listed in the project environmental specification, unless methods have been prescribed in this or the project environmental specification:

- rivers, streams, or any other open water body;
- wetlands;
- access roads (see PZ3.13 below);
- steep slopes (i.e. steeper than 1:4) or less if friable material is present;
- indigenous bush/ forest;
- close proximity (i.e. 50 m or less) to a residential dwelling;
- drilling and/or blasting of rock.

If a construction method employed by the Contractor is not environmentally acceptable to the Employer, the Contractor may be instructed to cease the utilisation of that method in favour of a more environmentally acceptable one, proposed either by himself or the Employer.

PZ3.1.2 Construction Programme

The Contractor will programme construction so as to minimise the impact on the environment and provide this programme to the Environmental Control Officer for perusal and acceptance at the onset of the contract period. The Environmental Control Officer is to made aware of any amendments to the construction programme or alterations to the scope of work in order that their impacts on the environment can be assessed.

The Contractor (through the Project Manager) will ensure that all affected landowners/ authorities are advised of the proposed programme at the beginning of the contract period.

PZ3.2 AREAS OCCUPIED / DEMARCATION OF SITE

Routes for temporary access and haul roads are to be located within the approved demarcated areas and vehicle movement is to be confined to these roads. Movement of vehicles outside the designated working areas is not permitted without authorisation from the Engineer.

All construction activities are restricted to working areas designated on the drawings and/or demarcated and approved by the Engineer. Materials including spoil are stockpiled at designated areas.

Any areas disturbed outside of the demarcated areas or without permission of the Environmental (Control) Officer or Engineer will be subject to reinstatement and rehabilitation (as per PZ4 below) to the Contractor's cost.

In terms of pipeline projects, a general maximum working servitude width of 15 m will apply for machine excavation unless otherwise indicated in the project specification. A maximum width of 6 m will apply for manual excavation. These maximum working servitude widths may vary depending on the sensitivity of the environment, as detailed in the project specification.

In sensitive biophysical environments, for example wetlands, indigenous forest / bush, pristine natural grasslands, and sensitive social environments, as defined in the project specification or

by the Environmental Control Officer, the working servitude is reduced as indicated in the project specification.

The working servitude shall contain all construction related activities, including, stockpiling of materials, placing of toilets, vehicle movement areas, etc.

Demarcation of linear projects (executed with machine excavation) and features (e.g. pipelines, access roads, etc.) will be by means of wooden stakes. These stakes will be at least 1 m high, painted white and placed at least every 15 m, on either side of the linear feature, in all areas where works are occurring. Progressive movement of stakes is required as linear projects progress.

In the case of a fenced site, the boundary fences will be denoted as the outermost limit of the site, but internal areas may be demarcated with stakes as above. The site boundaries of non-fenced, but 'contained' projects are to be delineated using stakes or temporary fencing, depending on the hazard which that site poses.

PZ3.3 SUPPLY OF WORKS FACILITIES

No water may be abstracted from water bodies for the purposes of construction, without approval of the Engineer in consultation with the Environmental Control Officer.

PZ3.4 CLEANLINESS

SABS 1200 AD, clause 5.2.4, second sentence, is to read: "No rubbish or debris shall be deposited below the full supply level (FSL)."

PZ3.5 SITE CLEARANCE

PZ3.5.1 Clearance

Spoil sites will require clearing and grubbing in addition to those areas in terms of SABS 1200 C 5.1.

The site shall only be cleared immediately prior to construction activities commencing i.e. at the last practicable stage.

No trees or indigenous shrubs may be removed without the prior permission of the Environmental (Control) Officer, unless in keeping with the final site reinstatement and rehabilitation plan.

PZ3.5.2 Disposal of materials

Material obtained from clearing and grubbing operations shall be disposed of at appropriate municipal disposal facilities. They are not to be disposed of as per Paragraph 1 of Sub-clause 3.1 of SABS 1200 C.

Wood obtained from clearing and grubbing operation remains the property of the landowner/ community and must be stacked at sites designated by relevant person. The Contractor will be required to remove and dispose of any wood from site at a designated site for vegetation disposal, should the landowner/ community not require it.

All tree trunks and branches of diameter greater than 50mm are to be cut into lengths not exceeding 2400mm.

Brush wood (i.e. < 50mm diameter) is to be disposed of, or utilised as specified in the project specification or upon instruction of the Engineer.

PZ3.5.3 Conservation of topsoil

The Contractor is required to strip topsoil (as defined in this specification) together with grass, groundcover and sedges from all areas where permanent or temporary structures are located, construction related activities occur, and access roads are to be constructed, etc. The depth to which topsoil will be stripped shall be 200mm unless stated otherwise in the project specification.

Topsoil is to be handled twice only - once to strip and stockpile, and secondly to replace, level, shape and scarify.

Topsoil is to be replaced along the contour.

Topsoil is to be replaced by direct return (i.e. replaced immediately on the area where construction is complete), rather than stockpiling it for extended periods. This is feasible for progressive construction (e.g. pipelines), but not necessarily so for reservoirs, site establishments, dams, etc.

Topsoil stockpiles are not to exceed 2 m in height.

Topsoil stockpiles are to be maintained in a weed free condition (i.e. no 'broad-leafed' plants regarded as weeds in terms of the Conservation of Agricultural Resources Act No 43 of 1989, or those plants regarded as a 'general nuisance in the area' are to be growing on the stockpiles). The Environmental Control Officer will provide guidance as to which plants are weeds and require removal.
The stockpiles are not to be contaminated with sub-soil, or any other waste material.

Topsoil may not be compacted in any way, nor may any object be placed or stockpiled on it.

Topsoil may not be compacted in any way, nor may any object be placed or stockpiled on it.

Topsoil which is to be stockpiled for periods exceeding 4 months is to be vegetated. In summer a mixture of Eragrotis tef (Teff) and Eragrostis curvula (Weeping Lovegrass) (ratio 1:2) is to be applied at an application rate of 6 kg/ha, unless otherwise instructed in the project specification.

In winter, a mixture of Lolium multiflorum (Annual/Italian Rye grass) and Eragrostis curvula (Weeping Lovegrass) (ratio 1:1) is to applied at an application rate of 6kg/ha (see PZ4 5.3 for sowing times), unless otherwise instructed in the project specification. Fertiliser is to be applied as per PZ4 5.2.

PZ3.5.4 Cutting of trees

Any tree branches which require removal are to be properly pruned and sealant applied to the cut surface, if required.

The Contractor's attention is drawn to Sub-clause 5.2.3.3 of SABS 1200 C with respect to work in indigenous forests.

Any indigenous trees or bush which require removal in terms of the project, and which have not been identified in the project specification or EMP, are to be timeously indicated to the Environmental Officer prior to work affecting them.

PZ3.5.5 Landscape Preservation and Conservation of Flora

Notwithstanding Clause 5.7 of SABS 1200 C, the Contractor will be required to transplant designated plants to alternative locations as specified in the project specification or identified by the Environmental Control Officer, upon the instruction of the Engineer.

Transplanting shall be undertaken by employing the following method:

<u>Removal</u>

- Mark the orientation of the tree/shrub (for example, the north-facing side of the trunk

indicated by a small arrow made with indelible ink) trunk. Do not scratch a mark on the surface of the trunk;

- Delineate a circle from the trunk with a radius equivalent to the drip-line of the tree, or as indicated by the Environmental Control Officer on site;
- Excavate the tree with an intact rootball.

Replanting

- A hole 500mm larger in diameter than the anticipated rootball must be prepared in advance of the tree removal in order that the tree can be replanted immediately;
- The tree must be positioned as per its original orientation;
- A planting method known as 'puddling' must be employed. This method involves the addition of soil and water simultaneously to expels air from the planting hole. Place the tree in its new hole, making sure the top surface of the rootball is level with the ground level. Place a hose pipe in the hole and leave it running whilst extra soil is added around the rootball;
- 'Compact' the tree in the hole and attach tree stays for stabilisation.

Compensatory planting of species may be required should transplantation not be feasible, as indicated in the project specification or upon instruction of the Engineer.

PZ3.6 EARTHWORKS

PSZ3.6.1 Backfill material

With reference to SABS 1200 DB sub-clause 3.5, no material stripped or excavated which is classed, in terms of this specification, as topsoil, may be used as backfill in any excavation.

PZ3.6.2 Excavation and backfilling

During excavation 'conservation of topsoil', as specified in PZ3 5.3 above will apply.

Excavated material is to be stockpiled along a pipeline trench within the working servitude, unless otherwise authorised.

Surplus excavated soft, intermediate and hard rock material shall not be disposed of along the pipeline trench as indicated in SABS 1200 DB sub-clause 5.6.3 and 5.6.4, but shall be removed to a spoil site (see PZ3.15 below) designated during the project if applicable, or agreed by the Engineer in conjunction with the Environmental Control Officer and Project Manager.

In certain cases, for example to help stabilise the disturbed area or to reinstate the natural aesthetics of an area, excess excavated intermediate and hard material may be disposed of in a designated manner along a pipeline trench, as indicated by the Environmental Control Officer and Project Manager, or in the project specification. In this case, rock material shall not exceed 250mm in maximum dimension (see PZ4 2.1).

In terms of SABS 1200 DB 5.6.5 and SABS 1200 LB 3.4.2, deficiency of backfill material shall not be made up by excavation within the free haul distance of 0.5km of site, without the prior approval of the Engineer of the source of the material. Where backfill material is deficient, it should ideally be made up by importation from an approved borrow pit (i.e. one which operates within the ambient of an EMPR.) (See also PZ3 14 below).

The Contractor will backfill in accordance with the requirements of progressive reinstatement.

The maximum length of open trench shall be specified in the project specification.

PZ3.7 SAFETY

All works which may pose a hazard to humans and animals are to be adequately protected and appropriate warning signs erected. The Contractor's attention is drawn to SABS 1200 D section 5.1 in this regard.

With reference to SABS 1200 D 5.1.1.3, where blasting is required in terms of the project, the Contractor will ensure that all structures in the vicinity that could be affected by the activity will be inspected and their condition photographically recorded (as necessary), prior to blasting.

Notice of intent to blast is to be provided to landowners timeously.
Speed limits, appropriate to the vehicle driven, are to be observed at all times on access roads. Operators and drivers are to ensure that they limit their potential to endanger humans and animals at all times, by observing strict safety precautions.

PZ3.8 PLANT

PZ3.8.1 Silencing of plant

With reference to SABS 1200 A amend: "built up areas": to read as "all areas within audible distance of residents (albeit urban, peri-urban or rural areas)."

Appropriate directional and intensity settings are to be maintained on all hooters and sirens.

Silencer units on equipment and vehicles are to be maintained in good working order.

Construction activities are to be confined to normal working hours (07h30 - 17h00) Mondays to Saturdays, except for the activities designated to be carried out at night.

PZ3.8.2 Appropriate use of plant

The Contractor will at all times use plant which is appropriate to the task in order to minimise the extent of damage to the environment.

PZ3.9 DEALING WITH WATER ON WORKS

PZ3.9.1 Disinfection of Potable Water Infrastructure

Disinfection water is to be neutralised before release of this water to the environment.

PZ3.9.2 Discharge of water from site

Any water which is discharged from site is to comply with the relevant Water Quality Guidelines implemented by DWAF.

Water discharged to the stormwater / sewer system may only be done so with the permission of the relevant local authority.

PZ3.10 CONTROL OF EROSION

Surface erosion protection measures will be required to prevent erosion where slopes are steeper than 1:8 on all soil types.

Erosion protection measures required may include all or some of the below, as specified in the project specification or upon instruction of the Engineer in conjunction with the Environmental (Control) Officer:

- use of groundcover or grass
- construction of cut off berms (earth and/or rockpack) - these are to be angled across the contour and normally would approximate an angle of 30o from the bisector of the contour.
- placing of brush wood on bare surface;
- pegging of wattle trunks or branches along the contour;

- hard landscaping, e.g. use of Loffelstein walls, ground anchors, gabions etc.

Scour chambers are to be fitted with energy dissipaters, or the jet of water directed onto a protected (i.e. grouted stone pitching/ rock pack/ reno mattress) area to dissipate water velocity and to control and prevent erosion.

Storm water drainage measures might be required on site to control runoff and prevent erosion.

PZ3.11 CONTROL OF POLLUTION

No waste in a solid, liquid or gaseous state shall be emitted from or spilled on the site without the approval of the Engineer.

No mixed concrete shall be deposited directly onto the ground prior to placing. A board or other suitable platform is to be provided onto which the mixed concrete can be deposited whilst it awaits placing.

Excess concrete from mixing shall be deposited in a designated area awaiting removal to an approved landfill site.

The Contractor will contain wash water from cement mixing operations, by directing the water into a sump for collection. The material contained in the sump will be removed to an appropriate landfill site.

No concrete rubble shall be present at the site.

Liquid wastes will not be disposed of to storm water drains. They may be disposed of to sewer only if permitted by (local council) legislation.

In the event of pollution of a water body (including sediment loading), the Contractor will provide alternative water supply to users of that water body until the quality of the water body is restored to its previous unpolluted state. For the sake of this clause, pollution is deemed to be a state which is substandard to the normal quality of the water body, but is not necessarily in contravention of the South African Water Quality guideline standards for a prescribed activity.

Any ancillary damages resulting from pollution of a water body will be repaired / remediated at the Contractor's cost.

Where, due to construction requirements, pollution of a water body may potentially occur, the Contractor is to ensure adequate measures (e.g. attenuation/ settlement dams / oil absorbent products) are in place to prevent pollution. A method statement is to be provided to this effect (see PZ3 1).

PZ3.12 CONTROL OF FIRE

The Contractor will ensure he has the necessary fire fighting equipment on site in terms of SABS 1200. This will include at least rubber beaters when working in 'veld' areas, and at least one fire extinguisher of the appropriate type when welding activities are undertaken, irrespective of the site.

PZ3.13 USE AND MAINTENANCE OF ACCESS FACILITIES

PZ3.13.1 Responsibility

The Project Manager [not the Contractor (SABS 1200 AD 5.3.1)] will be responsible for obtaining permission for temporary and permanent rights of way over all private property affected by project activities.

The Project Manager will ensure that the Contractor has kept a photographic record of all access facilities and that these are reinstated to a state not worse than upon commencement of the project and to the satisfaction of the landowner (not withstanding that the project's objective is not to upgrade landowners' access roads).

PZ3.13.2 Fencing

Temporary fencing is to consist of 1.2 m bonnox fencing, or similar, suitably tensioned and supported on 1.8 m fencing standards at 3 m intervals, with all necessary straining posts and stays.

All temporary fencing as indicated by the Engineer is removed on completion of the contract.

PZ3.13.3 New Access Roads

Any construction roads created for execution of the project are to be designed to incorporate adequate drainage and water attenuation structures.

Any access roads which incorporate 'cut and fill' aspects and/or which are to be surfaced during construction are to be authorised by the Environmental Control Officer and Project Manager. Prior to construction of the road, the Contractor will be required to provide a sketch plan of the road layout (referenced to local topographic, natural and man-made structures). Slope steepness, road width, drainage structures and their frequency will need to be documented and accompany the sketch layout.

Construction access roads may not be wider than that necessary (maximum width 4 m) for movement of vehicles in one direction only. Should two way traffic be required, points people are to control vehicle movement on the 'single lane' road or passing bays are to be used where specified in the project specification or as identified by the Engineer in conjunction with the Environmental Control Officer, unless otherwise stated in the project specification.
The cut and fill slopes of permanent roads will require grassing, as specified in the project specification or by the Environmental Control Officer, to increase stability and reduce aesthetic impacts. Hard landscaping may be required as per the project specification.

Temporary construction roads will require rehabilitation on completion of construction activities for which they were required. These roads will require rehabilitation as per PZ4 4 or as specified in the project specification. In the case of access 'tracks', only ripping to loosen compaction will be required unless otherwise stated by the Environmental Control Officer or project specification.

Access roads created by the project may only remain unrehabilitated on written request of the landowner, with his acceptance of the state of the road and a clause that the landowner accepts all responsibility for the road and its state.

PZ3.13.4 Maintenance of Existing Access Roads

The Contractor will record, photographically, the state of existing roads which are to be used for access, prior to plant utilising these roads.

During the contract period, the Contractor will ensure that all existing water attenuation and drainage structures are maintained in a state in which they can optimally perform their function.

Upon completion of the construction period, the Contractor will ensure that the access roads are returned to a state not worse than prior to construction commencing.

PZ3.14 BORROW PITS

Where the Contractor is required to import material this shall be from commercial sources or borrow areas specified in the project specification.

The Contractor may source material from alternative borrow pits provided: the site location; method of winning material and reinstatement and rehabilitation are environmentally acceptable and approved by the Environmental Control Officer.

In this regard, the Contractor shall give the Environmental Control Officer in writing, 30 days prior to opening up alternative borrow pits the following information for acceptance:

- quantities of borrow material required;
- method statement for excavation of material including depth and extent of excavation;
- anticipated 'active life' of the borrow area;
- proposal for reinstatement and rehabilitation of borrow area, including final profile;
- written approval from the landowner/ relevant authority that material may be removed from their land subject to their stated conditions, requirements, and royalties, and if the proposal is acceptable to the Environmental Control Officer.

Development and rehabilitation of borrow pit areas are likely to include the following activities (but these must not be regarded as exhaustive):

- Stripping and stockpiling of topsoil as per PZ3 5.3 of this specification;
- Removal (to nominal depth of 500mm) and stockpiling of sub-soil;
- Infill of borrow pit with spoil material;
- Contouring of borrow pit to approximate natural topography and/ or reduce erosion impacts on the site;
- Placement of excavated subsoil over spoil material;
- Placement of stripped topsoil on subsoil;
- Grassing of topsoil in terms of clause PZ4 4 of this specification.

The Contractor is to familiarise himself with the requirements of the Minerals Act No 50 of 1991 in terms of borrow pit development, and the requirements of the EMPR, as applicable.

PZ3.15 SPOIL SITES

Where the Contractor is required to spoil material, spoil sites must be identified which are environmentally acceptable and approved by the ECO, unless spoil site areas have been identified in the project specification, in which case these will be the designated spoil sites.

If no spoil sites have been previously identified together with reinstatement and rehabilitation criteria, the Contractor is to provide the following information to the ECO at least 30 days prior to requiring sites to spoil material:

- the location, description of and access to alternative sites identified in order that they may be assessed;
- the quantity of material to be spoiled;
- the type of material to be spoiled (i.e. blast rock/ excavated rock/ soft shale/ subsoil etc.);
- the proposed method of spoiling;
- the proposed reinstatement and rehabilitation plan including final profile;
- written approval from the landowner/ relevant authority that material may be spoilt on land subject to their stated conditions and requirements and if the proposal is acceptable to the ECO.

Development and rehabilitation of spoil areas are likely to include the following activities (but these must not be regarded as exhaustive):

- Stripping and stockpiling of topsoil as per PZ3 5.3 of this specification;
- Removal (to nominal depth of 500mm) and stockpiling of sub-soil;
- Placement of spoil material;
- Contouring of spoil site to approximate natural topography and/ or reduce erosion impacts on the site;
- Placement of excavated subsoil over spoil material;
- Placement of stripped topsoil on subsoil;

Grassing of topsoil in terms of clause PZ4 4 of this specification.

PZ3.16 NUISANCE

PZ3.16.1 Dust

At all times the Contractor shall control dust on the site, access roads, borrow pits and spoil dumps with water, chemical soil stabilisers or temporary surfacing as specified in the project specification or upon instruction of the Engineer.

Dust control shall be sufficient so as not to have significant impacts in terms of the biophysical and social environments. These impacts include visual pollution, decreased safety due to reduced visibility, health aspects, and ecological impacts due to dust particle accumulation.

On gravel or earth roads, vehicle speeds may not exceed 30km per hour.

PZ3.16.2 Noise

The operational layout of the construction site is to be designed to control and reduce noise from source (see clause PZ2 1).

Machinery and vehicle silencer units are to be maintained in good working order. Offending machinery and /or vehicles will be banned from use on site until they have been repaired.

Construction activities generating output levels of 85 dB(A) or more (excessively noisy), in residential areas, are to be confined to working hours (08h00 - 17h00) Mondays to Fridays only.

‘Normal’ or ‘noisy’ working hours may only be extended with the prior written approval of the Project Manager, who has been notified, at least 7 days in advance, of the impending work requiring extension.

The Project Manager will ensure that the neighbours are timeously forewarned of imminent noisy activities.

Should community complaints be received with regard to noise generation, the Contractor will, at the discretion of the Project Manager and Environmental Control Officer, provide an independent and registered noise monitor to undertake a survey of noise output levels from site, and implement measures to reduce noise to legislated levels.

PZ3.16.3 Visual

All site establishment components, as well as equipment, will be positioned to limit visual intrusion to neighbours (see clause PZ2 1 above).

The type and colour of roofing and cladding materials are to be selected to reduce reflection.

Security lighting (both temporary and permanent) and lighting required for specific works activities must be placed such that it is not a nuisance to residents and the general public.

PZ3.16.4 Interference with neighbours and public

No construction staff may approach site neighbours, for whatever reason, without the knowledge and permission of the Project Manager.

Complaints from neighbours and public with regard to interference from contract staff will be regarded in a serious light, and the offender(s) may be subject to disciplinary action.

PZ3.16.5 Disruption of Services

Disruption of services, e.g. road access, water and electricity, must be kept to a minimum at all times.

Where service disruption is unavoidable, the Contractor is to advise the Project Manager (at least 7 days in advance), who in turn will timeously warn the affected parties.

PZ3.17 SPECIAL ENVIRONMENTS

PZ3.17.1 Wetlands

Pipeline trenches which traverse wetlands shall be constructed as specified in the project specification. The Contractor will submit a method statement for work in wetland areas as per PZ3 1.1

Construction may not permanently alter the surface or subsurface flow of water through the wetland.

The Contractor shall submit a method statement for review at least 14 days prior to commencing construction in a wetland.

The Contractor will remove all wetland vegetation with their root ball intact. This vegetation is to be kept moist at all times. It is to be placed in the shade and covered with moistened hessian cloth until replanting, which is to be undertaken immediately surface reinstatement is complete.

No construction materials may be stockpiled in any wetland areas.

The pre-construction profile of the wetland shall be returned to one similar as before construction, with no created “ridge or channel” features present.

PZ3.17.2 River/ stream courses

The Contractor shall submit a method statement for review 14 days prior to commencing construction. The method statement should highlight (but not be confined to) the following issues:

- detailed plan of crossing including pipe protection works;
- how water flow will be diverted during construction (if applicable);
- containment of contaminated runoff and waste water;
- width of working servitude (if not already detailed in project specification);
- final expected profile of river/ stream banks;
- reinstatement and rehabilitation of river/ stream banks.

The Contractor will remove herbaceous riparian vegetation as indicated in the project specification or by the Environmental Control Officer, with their root ball intact. This vegetation is to be kept moist by means of placing it in the shade, covered with moistened hessian cloth until it is replanted.

The Contractor shall not modify the banks or bed of a water course unless as specified in the project specification.

Rocks for use in gabion baskets/reno mattresses may not be obtained from a water course.

The Contractor will not pollute any water body as a result of construction activities (see also PZ3 11).

The Contractor shall not cause any physical damage to any aspects of a water course, other than those necessary to complete the works as specified and in accordance with the accepted method statement

Where a stream or river-crossing requires the diversion of water, a method statement is to be provided to the Environmental Control Officer in this regard for review.

PZ4 REINSTATEMENT AND REHABILITATION

Scope: The intention of this section is to ensure that the condition of the areas disturbed by the project are returned to a state that approximates what they were before the project or better, within reason. The concept of progressive reinstatement is fundamental to cost effective (both financial and environmental) rehabilitation of a site. This concept must be followed at all times. Where landscaping is utilised, the concept is to utilise and restore indigenous plants to the site, in terms of the concept of xeriscaping.

Reinstatement will be required for all areas disturbed by the project. For pipeline projects, this will include the full working servitude, not just the top of actual excavation as per SABS 1200 DB (subclause 5.9.1.1)

Reinstatement and rehabilitation will ensure that all areas disturbed by the project are returned, within reason, to a state not worse than before the project commenced.

The Contractor will reinstate and rehabilitate all disturbed areas outside of the demarcated working area (as defined in terms of clause PZ3 2 or the project specification) at his own cost and to the satisfaction of the Environmental Control Officer and Project Manager.

PZ4.1 HOUSEKEEPING

All areas are to be cleared of rubble associated with construction. This includes the removal of surplus materials, excavation and disposal of consolidated waste concrete and concrete wash water, litter, etc.
All soil contaminated by hydrocarbons, for example from leaking machines, refuelling spills etc., is to be excavated to the depth of contaminant penetration, placed in 200 litre drums and removed to an appropriate landfill site.

PZ4.2 FINISHING

PZ4.2.1 Final Grading

Final levels of all disturbed areas are, where feasible in terms of the project requirement, to be consistent with the natural topography of the area.

In certain instances, it will be acceptable to reinstate rock onto a works area (e.g. pipeline servitude), provided that that rock does not exceed 250mm in maximum dimension and is placed in a manner consistent with the natural surrounds as indicated by the Environmental Control Officer and Project Manager.

All drainage lines affected by construction are to be reinstated to approximate their original profile. Where this is not feasible due to technical constraints, the profile is to be agreed upon by the Environmental Control Officer and Project Manager.

All compacted (disturbed) areas (including stockpile areas) are to be ripped (along contour) to a depth of 150mm prior to the replacement of topsoil.

PZ4.2.2 Topsoiling

Topsoil is to be replaced to a minimum depth of 100mm.

Topsoil is not to be compacted, but once replaced is to be scarified (to a depth of 50mm) consistent with the natural contour.

If insufficient topsoil is available, subsoil or similar material may be used that may be a suitable substrate after addition of soil improving substances e.g. compost, pH rectifiers (lime or gypsum) etc. Soil testing may be required at an approved facility.

PZ4.3 REINSTATEMENT OF WATER COURSES AND WETLAND AREAS

The Contractor will ensure that water course banks are returned to their original profile unless the project specification states otherwise.

The surface reinstatement of wetland areas is to ensure that no depressions remain which could act as channels for preferential water flow thereby affecting the hydrological regime of the wetland.

The Contractor will preserve all riparian and wetland vegetation for use in rehabilitation of those environments. This vegetation is to be kept moist at all times. It is to be placed in the shade and covered with moistened hessian cloth until replanting, which is to be undertaken immediately surface reinstatement is complete.

Plants are to be, as nearly as possible, replanted in areas from which they were removed.

PZ4.4 VEGETATION RE-ESTABLISHMENT

The Contractor will ensure that all areas disturbed by contract activities are revegetated to the specified standard.

This standard is deemed to be an 85 % cover with no areas in excess of 0.04 m2 / m2 remaining unvegetated.
Revegetation shall match the vegetation type which previously existed (e.g. kikuyu pastures are to be returned to kikuyu pasture; ‘veld’ grass to ‘veld’ grass, etc.), unless stated otherwise in the project specification.
Prior to re-grassing, and if required:

- the area is to be scarified or ripped (along contour) to a depth of 50mm to loosen compaction.
- weeds present on site are to be removed.

Re-grassing, where required, will be either by means of seeding, instant turf (sods), sprigs or plugs as specified in the project specification or as specified by the ECO.

Where sprigs or plugs are utilised, they are to be planted at 200mm centres. The fertiliser shall be applied as per PZ4 5.2. During summer, 25mm of irrigation shall be applied each week until reasonable (60%) ground cover has been obtained. During winter 15mm of irrigation shall be applied each week until reasonable (60%) ground cover has been obtained. The amount of irrigation to be applied will make up the difference between rainfall recorded on site and minimum requirement.

Where instant turf is utilised, it shall be laid as specified in the project specification. The fertiliser shall be applied as per PZ4 5.2. During summer, 25mm of irrigation shall be applied each week until all the turf is visibly growing. During winter 15mm of irrigation shall be applied each week until all the turf is visibly growing. The amount of irrigation to be applied will make up the difference between rainfall recorded on site and minimum requirement.

Grassing shall be undertaken by a specialist grassing Sub-Contractor, unless permission is granted otherwise by the Engineer upon receipt of a written motivation from the Contractor.

The Contractor shall state in writing when the regrassing operation will commence and its expected duration (dates).

Grassing in 'veld' areas is to be undertaken as per PZ4 5 below. Cynodon dactylon species may be excluded or substituted from this mixture at the discretion of the Environmental Control Officer, or as specified in the project specification. The seed bulk may be made up with the Eragrostis tef.

PZ4.5 "VELD GRASS" GRASSING SPECIFICATION

The area to be grassed should be estimated and converted to hectares,
e.g. 100m X 100m = 10 000m2 = 1ha. All fertilizer and seeding rates used in this specification are with respect to hectares.

PZ4.5.1 Regional areas

For re-grassing three distinctive areas exist. These are defined as:

- the Coastal area (a narrow band running from the coast to ≈15km inland of the coast)
- the Coastal hinterland (a broad band (≈50km wide), generally defined as westwards of the coastal belt, and below 800m a.s.l.)
- the area above ≈ 800m a.s.l. (also called Midlands area).

PZ4.5.2 Fertiliser

Standard 2:3:2 (N:P:K) fertiliser shall be used on all sites.

The rate of application will be:

- 200 kg/ha in the Coastal Hinterland areas, and
- 300 kg/ha in the Midlands and Coastal areas.

PZ4.5.3 Planting times

Summer (includes Spring) is considered to be between the 1 September and 28 (29) February.

Winter (includes Autumn) is considered to be between 1 March and 31 August.

Re-grassing will be undertaken (as far as possible) in summer as germination and establishment of grasses is most effective, assuming reasonable spring rains.

Vegetation re-establishment is likely in many cases to be held off until this suitable growing season.

Hydroseeding with a winter mix will only be specified where regrassing is urgently required and cannot wait until the summer season. In this case irrigation will be required as per PZ4 5.4 below.

PZ4.5.4 Establishment and maintenance

During summer, 25mm of irrigation shall be applied each week until reasonable (60%) ground cover has been obtained.

During winter (where annual rye grass is specified) 15mm of irrigation shall be applied each week until reasonable (60%) ground cover has been obtained.
If rapid establishment is required, additional watering may be necessary as specified in the project specification
The amount of irrigation to be applied will make up the difference between rainfall recorded on site and the minimum requirement.

PZ4.5.5 Grass Seed Selection and Application Rates

The specific seed selection and application rates for each of the defined areas are covered separately, as follows.

PZ4.5.5.1 Coastal area

Summer mix (1 September - 28 February)

Grass species	Common name	General application rate (kg/ha)
Eragrostis tef	Teff	5
Eragrostis curvula	Weeping lovegrass	10
Chloris gayana	Rhodes grass	10
Digitaria eriantha	Smuts' fingergrass	5
Total		30

Winter mix (1 March - 31 August)

Grass species	Common name	General application rate (kg/ha)
Lolium multiflorum cultivar - Midmar	Annual/Italian rye grass	10
Eragrostis curvula	Weeping lovegrass	10
Chloris gayana	Rhodes grass	5
Total		25

PZ4.5.5.2 Coastal hinterland.

Summer mix (1 September - 28 February)

Grass species	Common name	General application rate (kg/ha)
Eragrostis tef	Teff	5
Eragrostis curvula	Weeping lovegrass	10
Chloris gayana	Rhodes grass	10
Cenchrus ciliarus	Blue buffalo grass	2
Cynodon dactylon	Couch/KWeek/Star grass	10
Total		37

Winter mix (1 March - 31 August)

Grass species	Common name	General application rate (kg/ha)
Lolium multiflorum cultivar – Midmar	Annual/Italian rye grass	10
Eragrostis curvula	Weeping lovegrass	10
Chloris gayana	Rhodes grass	5
Cenchrus ciliarus	Blue buffalo grass	2
Cynodon dactylon	Couch/KWeek/Star grass	3
Total		30

PZ4.5.5.3 Midlands area

Summer mix (1 September - 28 February)

Grass species	Common name	General application rate (kg/ha)
Eragrostis tef	Teff	4
Eragrostis curvula	Weeping lovegrass	10
Chloris gayana	Rhodes grass	10
Digitaria eriantha	Smuts' fingergrass	2
Cynodon dactylon	Couch/KWeek/Star grass	2
Paspalum notatum	Lawn paspalum	2
Total		30

Winter mix (1 March - 31 August)

Grass species	Common name	General application rate (kg/ha)
Lolium multiflorum cultivar - Midmar	Annual/Italian rye grass	10
Eragrostis curvula	Weeping lovegrass	10
Chloris gayana	Rhodes grass	5
Paspalum notatum	Lawn paspalum	2.5
Total		27.5

PZ4.5.6 Seeding methods

Two methods are recommended, namely hydroseeding and hand-broadcasting. The required method shall be as specified in the project specification.

All seed supplied should be labelled in accordance with the Government Seed Act No. 20 of 1961 and the Contractor shall be required to produce such certification, if requested by the Engineer.

PZ4.5.6.1 Hydroseeding

The Grassing Contractor shall be conversant with this method.

Cellulose pulp (consisting of either wood shavings, shredded straw, shredded paper or cotton waste) shall be added to the mix to be applied at a rate of 250 kg/ha.
In addition to the cellulose pulp, compost (consisting of either chicken litter, kraal manure, sugar cane filter cake or mushroom compost) shall be incorporated at a rate of 5m3/ha (≈100 X 50kg fertiliser bags/ha).

PZ4.5.6.2 Hand-broadcasting

Fertiliser, at the appropriate rate, is to be distributed by hand in a manner to ensure that there is an even spread of fertiliser over the site. This is to be done prior to seeding.

The seed mix is to be weighed and made up in an appropriately large container which shall be stirred to ensure no settling out of the grass seed, and a uniform distribution of the different types of seed.

The seed is to distributed by hand in a regular grid broadcasting manner to ensure that there is an even spread of grass over the entire site.

The area seeded is to be raked over once the seed and fertiliser have been applied to incorporate these elements into the topsoil.

PZ4.5.7 General

Where there is a possibility of neighbourhood livestock grazing a rehabilitated site these should, as far as is practicable, be excluded for the first 3 months of re-grassing.

PZ4.6 LANDSCAPING

Landscaping of the site may be required as indicated in the project specification.

Compensatory planting of trees or shrubs may be required should the transplantation of such not be successful in terms of PZ3 5.5 or due to plants removed in terms of PZ3 5.4

Planting of trees will be in accordance with the following method:

- All tree holes shall be square in plan;
- Tree holes shall be a minimum of 600mm by 600mm square by 700mm deep;
- Holes are to be backfilled with excavated soil in a ratio of 3:1 with compost. The compost is to be weed free and have been composted at temperatures in the order of 65^{o}C. Where possible, any available topsoil should be placed in the hole at the level where the tree rootball will rest. A handful (half-a-cup) of each Superphosphate and 2.3.2 should be mixed into the soil-compost mix;
- The tree holes are to be backfilled to the point where the tree and its rootball are in the desired position. The tree is to be removed temporarily and the hole filled with water and allowed to drain away. This operation of watering and draining should be repeated at least four times in order that the surrounding ground and hole are thoroughly moist. The tree is

then to be replaced and the remaining soil replaced;

- All trees shall be tied (using a tree tie) to a suitable timber stake planted in the ground to a depth of at least 500mm. The stake shall have a minimum diameter of 35mm and shall be at least 300mm higher than the planted tree;
- Water retaining basins of at least 500mm diameters are to be formed around each tree;
- The Contractor is to apply at least 10 litres of water per tree per fortnight for a period of at least 3 months.

The planting of shrubs will be in accordance with the tree planting method with the exception that the holes are to be a minimum of 400mm by 400mm square by 500mm deep, and that the tree stakes and ties are not required.

PZ4.7 ALIEN PLANT CONTROL

All sites disturbed by construction activities will be monitored for colonisation by invasive alien plant species.

The Environmental Control Officer will identify those plants which require removal during both the construction and maintenance period, for the Contractor's action.

The Environmental Control Officer will provide advice as to effective methods of removal and control of alien plant species.

PUBLIC COMPLAINTS REGISTER

DATE	COMPLAINANTS NAME	DESIGNATION/ AFFILIATION	REASON FOR COMPLAINT	ACTION TAKEN	ACTION BY	ACTION BY DATE	ACHIEVED BY DATE	DATE REFERRED TO NW environmental control officer

MONITORING OF COMPLIANCE WITH ENVIRONMENTAL SPECIFICATIONS

PROJECT NAME: ……..

CONTRACT NUMBER: …….

PROJECT MANAGER: ……

ENGINEER'S REPRESENTATIVE / SUPERVISOR: …….

CONTRACTOR: …….

CONTRACT PERIOD: ……
(including start and completion dates):

PERIOD COVERED: ……

REPORT PREPARED BY: ……

Signature

ENVIRONMENTAL CONTROL OFFICER REPORT

PROJECT NAME: **CONTRACT N°**

DATE OF SITE INSPECTIONS DURING REPORTING PERIOD:

Specification Breach	Spec. No.	Remedial Action Recommended	Due Date	Authority Responsible	Action Taken

PUBLIC COMPLAINTS

Complainant	Designation/ Affiliation	Date of complaint	Reason for Complaint	Action taken and date

GOOD PERFORMANCE REPORT

List any aspects of the Contract in which the Contractor is performing well and beyond that which is required in terms of the specification.

Photographs

Include photographs which illustrate aspects of non-compliance and good performance.

Photograph 1 Caption	Photograph 2 Caption