

SCOPE OF WORK

RFQ No.: /25

Description: Supply Install and Commission Laser Scanner and Associated Point Cloud Processes and Modelling Package for Survey and Geotech Application at Foskor Phalaborwa Mine

1. PRE-QUALIFICATION

A laser scanning with a range of 2000m or more without compromising the resolution or data quality.

2. INVITATION TO TENDER

Foskor (PTY) Ltd. invites you to submit an RFQ for the supply, installation and commissioning of a brand-new laser scanner that complies with the latest design standards. This includes the associated tools for point cloud data processing and analysis. Furthermore, it includes the provision of training on the operation of the scanner to ensure the availability of high-resolution images for geotechnical analysis and visualization. This document describes all the required work for the project.

2.1 DEFINITIONS AND ABBREVIATIONS

BOQ	–	Bill of Quantities
BRA	–	Baseline Risk Assessment
COC	–	Certificate of Compliance
COP	–	Code of Practice
CTD	–	Critical task Descriptions
DAP	–	Diammonium Phosphate
HIRA	–	Hazard Identification and Risk Assessment
MAP	–	Monoammonium phosphate
MCOP	–	Mandator Code of Practice
MHSA	–	Mine Health and Safety Act
OH&S	–	Occupational Health and Safety

3. SCOPE OF WORK

In opencast mining operations, people and equipment are many times at the base of a steep high wall slope and the high waste dumps. There are many instances when slopes fail which consequently damages the equipment including injury & loss to precious human lives. It has been observed and analysed that every slope failure has a precursor movement of small mass of the rock /slope body or precursor change in slope geometry of section of slopes hours before. Monitoring of slopes is critical in any surface mine. The rock mass behaviour can be predicted by digital or manual mapping of geological structures using a laser scanner. Geotechnical mapping is performed to determine the

orientation of any geological structures and to allow for the potential mechanism of failure (geotechnical risks that could impact the safety of the operation) to be determined.

3.1 **SCOPE**

- It is expected from the supplier to supply, install and commission a Terrestrial Laser Scanner to Foskor Phalaborwa in accordance with the specifications and requirements of this document.

3.1.1 **Scope of supply**

The Supplier must submit a tender for the product supply and commissioning of a Terrestrial Laser Scanner that integrates Long-range Laser Scanning hardware with processing and modelling software for survey, geological, engineering and geotechnical use in large open pits and structures.

It is the responsibility of the Supplier to make delivery of the equipment and accessories under this Scope. The Supplier shall, at his or her own expense, be responsible for the delivery to the Site of the equipment, materials, including but not limited to securing of permits and customs clearances, and payment of handling costs, storage costs, releasing costs, transportation costs, and duties, taxes, imposts, excise and charges of any kind that may be imposed by the South African Government, or any of its agencies and political subdivisions relating to the supply and delivery to the site of the imported plant and equipment, materials and Contractor's plant and equipment.

TAKE NOTE - Foskor pays for equipment delivered to Foskor site only!

NB: The Supplier/ consultant must clearly state in his or her tender submission if there is an exclusion on the Foskor scope, failure to state the exclusion will mean that the full Foskor scope is still applicable.

3.1.2 **System information**

Panasonic tablet tough book.

Effective hard casing/ housing for the scanner when transported.

The equipment shall be equipped with self-sufficient energy source plus backup battery

Reliable operation with capability for accurate 24/7 continuous scanning, design conformance,

Slope monitoring and fragmentation analysis, and additional reporting features as well as scanning at from multiple locations with built-in ease of information orientation and scans stitching.

The laser scanner should be complete in all respect with all the accessories, software, etc required for successful commissioning of the system.

The data compatibility with other 3rd party software and systems must be possible namely: **MicroStation, Datamine, Rocscience and Sable**. If there are additional costs for achieving compatibility, include in your pricing.

3.1.3 Standard Features of the Terrestrial Laser Scanner

Laser scanner system must consist of the following standard components:

Laser scanner should be IP65 protected to be able to perform effectively in tough conditions.

Laser Scanner should be able to perform effectively at a range of 2 km or more.

The scan angle should be of 360° Horizontal and 90° Vertical.

The measurement accuracy range should be 5mm, with repeatability of 4mm.

Laser scanner must have high resolution integrated panoramic camera

The Terrestrial Laser Scanner Software must have the following details:

- Must have output data on at least .e57 and .las file formats
- Must support cloud to cloud registration easily referenced
- Must provide tools for filtering and modelling point cloud data
- Must provide tools for topographic volume calculations
- Must be able to aid the user to determine toes and crests
- Must be able to aid the user to perform structural mapping by manual and automatic methods
- Must be able to generate photogrammetric surfaces

Desktop system requirements for processing are as follows:

- Processor: 34 or 64bit Intel or AMD CPU, i7 series equivalent or higher
- Operating System: Microsoft Windows® 10 x64 bit.
- Internet Connectivity: Recommended RAM 32 GB RAM or more.
- Storage: 1 TB SSD or 7200 rpm HDD for local data storage. Gigabit LAN or faster for larger remote storage 10 GB total disk space for installation 4 GB free disk space for swap files.
- Graphics Card: OpenGL 4.3 or later compliant dedicated video card, 4 GB Video RAM or more. GeForce RTX or equivalent, Display 1920 x 1080 resolution or higher.
- Dual monitors recommended. All displays should be set to the same scale (Windows display setting) for best experience and may require different resolution on some monitor screens to ensure consistency of scaling.

3.1.4 Implementation

Meet with the relevant Foskor team members to discuss and review geotechnical, survey and geological requirements with regard to successful implementation of the following:

- Geotechnical analysis

- Slope design compliance
- Volume calculation
- Mapping (Crest, Toeas, Structural Discontinuities, Structures such as buildings, Equipment)

3.1.5 Typical Deliverables/Examples of what the Terrestrial Laser Scanner will produce

The following Sections shows Expected Typical Deliverables/Examples of what the Terrestrial Laser Scanner will produce.

The laser scanner must allow for safely creating and tracking of toes and crest lines, accurately representing changes in the pit, including areas that are difficult to access due to poor ground conditions. Once scanning is complete, the data can be processed to easily generate toes and crests using a survey tool integrated into the system.

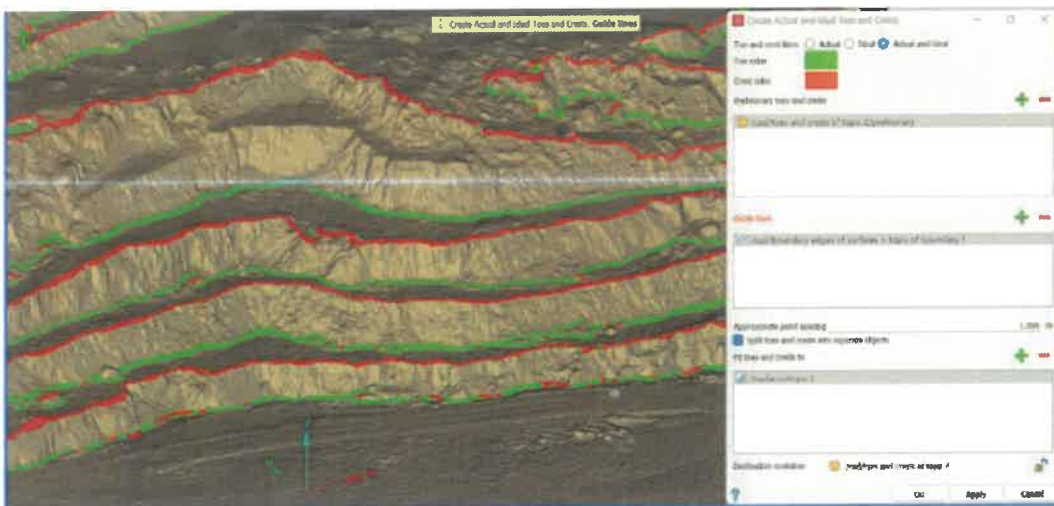


Figure 1: Typical example of toes and crest generated from data collected by a laser scanner

3.1.5.1 3D point cloud data

Laser scanner must include the tools that enables safe and efficient acquisition of critical point cloud data for survey or geotechnical solutions.



Figure 2: 3D point cloud data

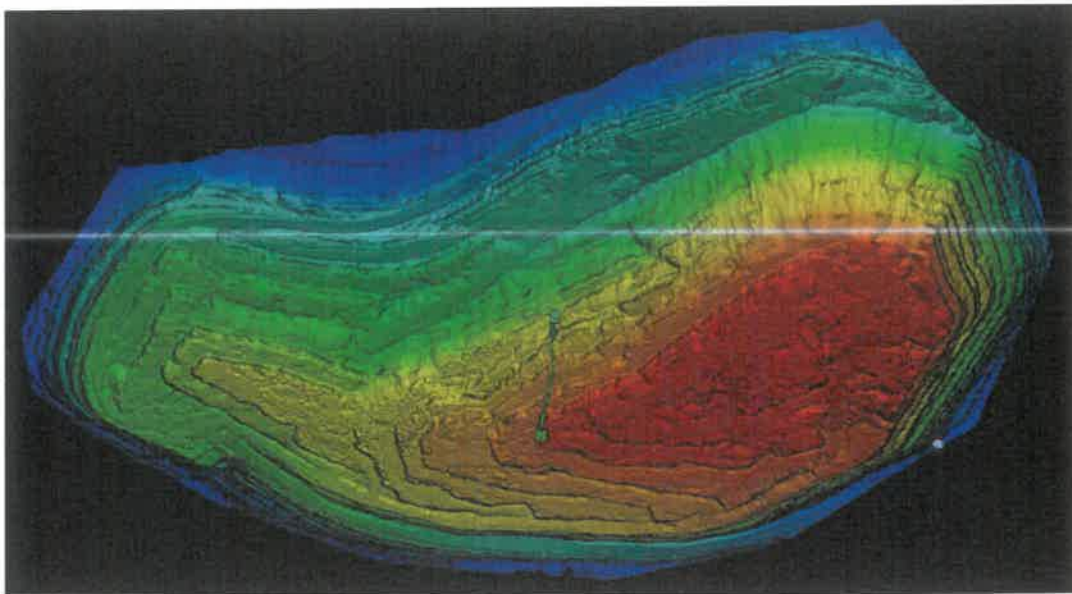


Figure 3. Surface created from data collected by Laser Scanner

3.1.5.2 Structural mapping and kinematic analysis

The scanner must allow for multiple scans to provide sufficient point cloud density to produce a high-resolution model of the highwall face to be mapped for structure and kinematic analysis. The probability of failure can also be determined from structural mapping.



Figure 4. Surface created Multiple Scans processed for Geotech purposes

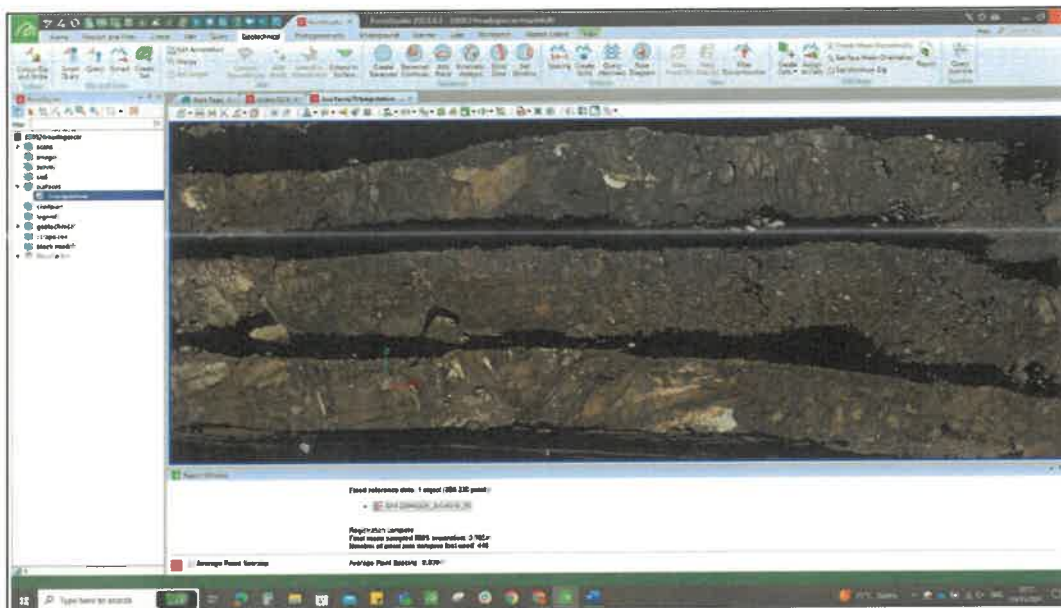


Figure 5: High-definition model for Geotech Analysis

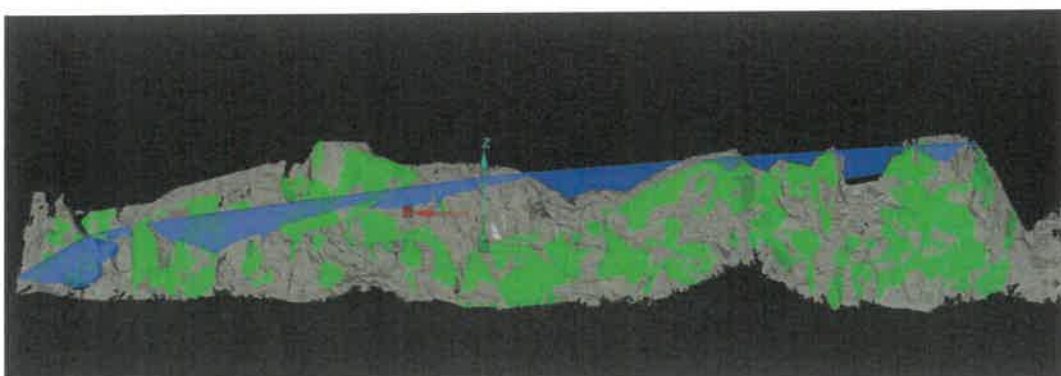


Figure 6: Mapping results

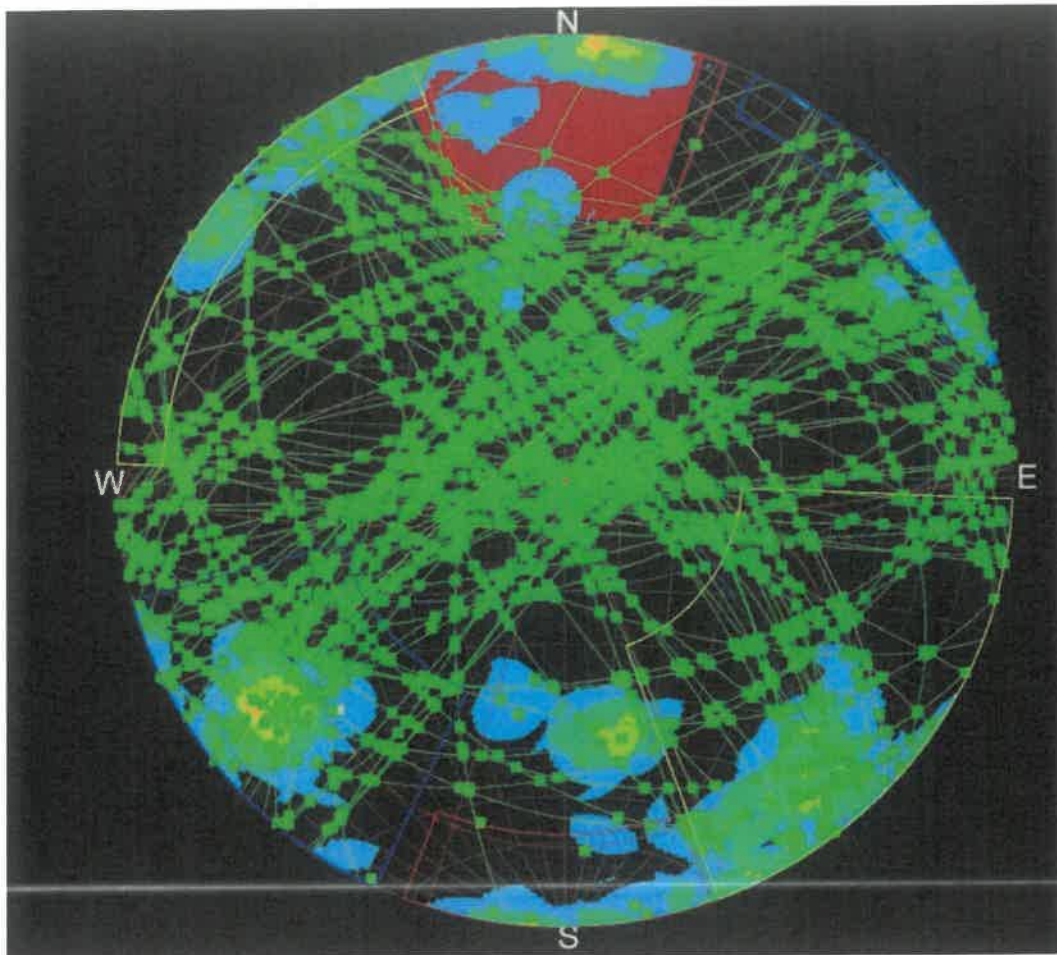


Figure 7: Kinematic analysis

3.1.5.3 Compliance to design

Laser scanner can used to check compliance to design. Data from the laser scanner can be used to optimize pit slope angles. Pit slope angle optimisation can be done using data located form the laser scanner. Therefore, a need for design adjustment for safe, economical mining, e.g. a different slope angle or catch bench width can be realised.



Figure 8. Design compliance verification

3.1.6 Obligation of the service provider

- Provide training to the end users (Geotech, Geology and Surveyors personnel) on the operation of the unit as well as associated software for geotechnical mapping and slope stability analysis.
- Provide on-site technical support to ensure maximum operation of the unit.
- Software Updates and Software Version control.
- Proposed Service Level Agreement (inclusive of a replacement/rental unit)

3.1.7 Obligation of the Company includes:

Provide screening examination at the contractor's expense due at Foskor's applicable rates.

Provide first issued of ID card(s) to the Supplier personnel.

Provide the Supplier with the necessary information required to commission the laser scanner system.

On-site transport.

4. PROJECT URGENCY

Project urgency is defined below:

This is an urgent and a very important project and will have to be completed within 12 weeks including on-boarding and use training.

5. DELIVERY OF EQUIPMENT

It is the responsibility of the Supplier to make delivery, off-load, all equipment and accessories.

The Supplier shall, at his or her own expense, be responsible for the delivery to the Site of imported plant and equipment, materials and supplier's product in connection with the execution of the Scope , including but not limited to securing of permits and customs clearances, and payment of handling costs, storage costs, releasing costs, transportation costs, and duties, taxes, imposts, excise and charges of any kind that may be imposed by the South African Government, or any of its agencies and political subdivisions relating to the supply and delivery to the site of the imported plant and equipment, materials and Contractor's plant and equipment.

NB: The Supplier/ Consultant must clearly state in his tender submission if there is an exclusion on the Foskor scope (As per the site meeting procurement scope and site meeting minutes) Failure to state the exclusion will mean that the full Foskor scope is still applicable.

6. DATA BOOKS

During the official handover, the service provider shall submit a detailed DATA BOOK that shall contain the following documents and information:

- a) All certificates (Manufacturer & Calibration), quality documents and records to be cross-referenced for purposes of traceability.

NB! ALL CERTIFICATES AND DOCUMENTS MUST BE CROSS-REFERENCED

7. MANUALS AND DOCUMENTATION

The following must be supplied:

- Commissioning and handover documents.

7.1 FORMAT OF DOCUMENTS AND MANUALS

Note! - All Manuals must be in English

Hard Copy: Book or binding arch file format and must be durable and of high quality.

Soft Copy: Manuals, Reports and Data Books – Word, Excel, PDF, etc.

Storage – Compact Disk or Data traveller

Language: English

7.2 SITE GEOGRAPHY

The mine is located at Phalaborwa, Limpopo, South Africa

7.3 AMBIENT CONDITIONS

- Ambient temperature

Summer	35 °C Avg.	50 °C Max
Winter	17 °C Avg.	2 °C Min

- Site Altitude: 380 m
- Prevailing wind direction: Generally South Easterly - Maximum design velocity 40 m/s (144 km/h)
- Very dusty conditions
- Average annual rainfall = 540 mm

7.4 PROJECT PLANNING/SCHEDULING

- A Delivery schedule or promised date needs to be submitted with the tender
- Regular formal updated needs to be submitted on an agreed frequency to the indicated FOSKOR person

8. GENERAL CONDITIONS – COMMERCIAL

8.1 EXTENSIONS, PENALTIES AND RETENTIONS

- Extension on the promised completion or Milestone date may be requested but needs to be approved by FOSKOR. The contractor should be in possession of a formal document issued via FOSKOR Procurement indicating that this request was approved
- Any additional works not defined in the order needs to be approved by FOSKOR in writing before any work commence.

Description	Condition	Duration
Penalties	2% per week to max 10% (weeks)	Late Delivery after promised completion date
Performance Bond	0% of Contract Value	0 Year after completion
Retention	0 % of Contract value	
Type of Contract	FOSKOR General condition of contract	
Tender price validity	As per tender document	
Escalation	None	None

All delays must be immediately brought under the attention of the section engineer and the responsible party agreed upon immediately.

9. TENDER EVALUATION CRITERIA

9.1 MANDATORY REQUIREMENTS

Bid submission not meeting the mandatory requirement will result in the bid being disqualified.

No	Mandatory Requirements	Comments
1	Previous experience in the Supply and Implementation of Terrestrial Laser Scanning for distances greater than 2000 meters and proficient in mine surveying and point cloud data processing, with a particular focus on large open pit mines.	Submit documented proof and references including contact details

10. EVALUATION CRITERIA (TECHNICAL) NOTE

Evaluation Criteria (Technical)				
T(Insert RFQ Number)/25 -				
Supply and commissioning of Terrestrial Laser Scanner and Associated Software to Foskor Mine				
No	Technical Criteria Description	% Contribution	Proof / documents to be submitted	Notes
- Section Weight not to be less than 25%				
1)	Experience & Team competence Relevant experience in Terrestrial Laser Scanning for Survey, Engineering and Geotechnical use. Application in hard rock pit slopes. Consideration will be given to diversity of projects worked on Scoring: 0-2 year 25% 2-5 years 50% 5-7 years 75% 10 years 100%	25%	Give reference list of projects, with values and contact numbers for verification	
2	Relevant experience in Open pit mine operations management Team experience to cover Geotechnical Stability analysis, Mine Survey, Volume calculation, point cloud data processing and modelling, including training. Scoring: No experience 0% 5 year 25% 4-7 years 50% <15 years 100%	20%	Provide details of previous work done particularly in a large open pit mine	
3	Company Capacity – <u>Weight not to be less than 20%</u> Project team Organogram indicating names, positions, trades for this project Scoring: No Organogram 0 % Organogram and operating a scanner skill 50% Organogram and operating a scanner, processing point cloud data skills 100%	20%	Submit Bidder organogram with names, position, and skills.	
4	Onsite support turnaround time 72 hours 25% 48 hours 50% 24 hours 75% <12 hours 100%	10	Indicate on the submission	
5	Project completion lead time : 1- 2 Months 100% 3 months 75% 3-4 months 50% >4 months 25%	15%	Bidder to provide timelines	
6	Onsite Training No training 0 % Included on the pricing 50% Free training =100%	10 %	Indicate training terms and period	

Evaluation Criteria (Technical)				
T(Insert RFQ Number)/25 - Supply and commissioning of Terrestrial Laser Scanner and Associated Software to Foskor Mine				
No	Technical Criteria Description	% Contribution	Proof / documents to be submitted	Notes
	Total Technical Score	100.00%		
Note: In order for the bid to be considered the bidder needs to score 70% and above, and comply to all mandatory requirements				

11. PRICING SCHEDULE

11.1 UNITS OF MEASUREMENT

The units of measurement described in the Bill of Quantities are metric units. Abbreviations used in the Bill of Quantities shall refer to a Unit (Inclusive of its accessories and related Hardware and Software).

11.2 BILL OF QUANTITY (BOQ) - PRICING SCHEDULE -

NUMBER	ITEM DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R
A.	PRELIMINARY AND GENERAL				
A.1	Laser Scanner System	sum	1	R	R
A.2	(with camera, Tablet with software, rugged type carry case, warranty on parts/labour)				
SUB-TOTAL:					
B.	Software licence				
B.1	Geotechnical and Surveying Tools	Sum	1	R	R
C	Annual Subscription				
C.1	Service Level Agreement proposal for 1 year	Sum	1	R	R
SUB-TOTAL:					
D.	Shipping and Handling				
D.1	Delivery of laser scanner to Foskor	Sum	1	R	R

NUMBER	ITEM DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R
E	Training				
E.1	On site hardware and software training	Sum	1	R	R
SUB-TOTAL:					
TOTAL:					

All price alterations must be signed for by the bidder confirming that such changes were made by the Bidder. **PLEASE NOTE THAT PRICE CHANGES WITHOUT A SIGNATURE WILL LEAD TO THE DISQUALIFICATION OF THE BID SUBMITTED.**

NOTE: The onus lies with the tenderer to make sure that all formulas and calculations are correct. Calculation errors discovered during the evaluation process will be logged as a non-conformance and the tender/quotation will therefore be discarded.

Initiated by

 SD4748

N Masole

Chief Rock Engineer

Supported by

 SD4852

L Nkoana

Acting Senior Manager