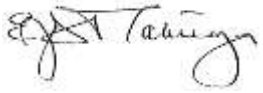
BLUESTONE QUARRY WALL RESTORATION PROJECT

IMPLEMENTATION PLAN

(AHSA) Archaeological and Heritage Services Africa (Pty) Ltd
Reg. No. 2016/281687/07

48 Jacqueline Street, The Reeds, 0157, Centurion, Pretoria
Email: e.matenga598@gmail.com.
Cell: +27 73 981 0637 / +2784 073 7774
Website: www.archaeologicalheritage.co.za

DOCUMENT CONTROL

PREPARER	**DESIGNATION**	**SIGNATURE**	**DATE**
Dr Edward Matenga	Heritage Specialist		30/09/2020

CONTENTS

1. INTRODUCTION

Archaeological and Heritage Services Africa (AHSA) (Pty) Ltd has been appointed by the Robben Island Museum for the planning and implementation of the restoration of the Bluestone Quarry Wall at Robben Island. The Scope of Work translates into several streams of work including the following:

1. *Review relevant reference materials, i.e. books, articles, and video/audio recordings on the prisoners who worked in the quarry and built the wall:*
2. *Study Robben Island Museum's Integrated Conservation Management Plan as a basis upon which the stone wall and quarry will be managed.*
3. *Develop a Statement of Significance with the eventual object of producing a conservation management for the Blue Stone Quarry.*
4. *Conduct a condition survey of the BSQW detailing the conservation issues to be addressed.*
5. *Consulting relevant stakeholders*
6. *Constructing a sample wall of at least 5 m in length for evaluation and approval. Decision to proceed with the implementation will be based on the approval of the sample.*
7. *Develop an Implementation Plan to restore the BSQW with local materials on condition that such restoration is reversible; and to avoid the introduction of disturbing material and structures that impact on the aesthetic value of the surroundings.*
8. *Planning session with EPPs, RIM Managers.*
9. *Consultation with EPPs as part of infusing their social memory into retaining authenticity from the broadest sense.*
10. *Preliminary identification and procurement of artisans (stone masons) in South Africa and other regions.*
11. *Restoration and reconstruction of the Wall in accordance with the Implementation Plan.*
12. *Develop a maintenance and restoration plan, with documentation procedures and monitoring methodology.*
13. *Presentation of the project and educational value.*
14. *Archaeological investigation of the site.*

2. KEY ISSUES AND STRATEGIC OBJECTIVES OF THE PROJECT

The Bluestone Quarry Walls are of the type called dry stone masonry structures, one of the fundamental properties of which is the absence of mortar or binder. By lacking a binder the physical integrity of the structures is dependent on gravity and friction. Out of necessity the political prisoners working in the Bluestone Quarry had to construct a dyke to prevent the entry of seawater into their working area as the quarry was located close to the seashore. The prisoners had to figure out the design and procure building materials[1], whereas the easier route would have been for the prison authorities to provide a safe and secure work environment. Therein lies the cultural significance of the Bluestone Quarry Walls (BSQW) that while there were a number of design options to construct a solid structure of sufficient strength to separate the sea from the working area, including the application of a cement, the prisoners had not the luxury of choice since their captors in providing this one option intended to inflict punishment. Understanding the historical development of the Blue Stone Quarry Walls and its cultural significance underpins the approaches and methods to rehabilitate and maintain the site.

2.1. Statement of Cultural Significance

The Bluestone Quarry wall was made by prisoners using locally available materials, in large part waste from the stone quarry. More than a thousand prisoners worked in the quarry. It was not because the prison authorities did not have funds to build a solid and permanent barrier. As the ex-prisoners testified, they were aware of the futility of offloading sand and grit to buttress the wall only to find it washed away by the waves the following day, a situation which the warders were cynically aware of. The Wall and Quarry therefore preserve memories of man's endurance against adversities imposed by his own kind. The wall is one of the surviving symbols of punishment with production. A number of political and social activities affecting the course of the political struggle and the lives of the inmates took place at the quarry. The first hunger strike took place at the quarry in 1996, which brought the attention of the warders to the welfare of the prisoners.

[1] The testimonies of the ex-political prisoners captured in audio-visual recordings (Mayibuye Archives) and summarised in Matenga, E. 2004: *Conservation Management Plan for the Blue Stone Quarry and Wall on Robben Island World Heritage Site (unpublished).*

Prisoners also shared information and ideas, passing notes which they hid in wall. Political education was also conducted at the quarry. Educated colleagues taught their less fortunate colleagues literary skills. The prisoners sang songs which subtly expressed their grievances against the status. The potency of song as a catalyst in cultivating solidarity and collective resolve among comrades is the South African liberation struggle is all too well known. The prisoners turned adversity to their advantage using the wall as a windshield and a cache for sensitive information. The wall and quarry is a monument to the resilience and fortitude of those who were subjected to extreme persecution and indignity for their political convictions.

ACTION: In line with the aim of the project to retain cultural significance of Bluestone Quarry precinct, the principle to conserve the dry stone walls in their original form and design is an important minimum standard which has been accepted. These principles are enshrined in the National Heritage Resource Act (No 25/1999)[2], the ICOMOS Burra Charter (1999) and the Nara Document on Authenticity (1994). Any other design option would be a fundamental departure from the statement of value and utterly disrespectful of this sacrosanct aspect of the Bluestone Quarry Walls.

3. THEORETICAL APPROACHES AND FUNDAMENTAL PRINCIPLES

The proposed treatment of the Bluestone Quarry Walls which is detailed in this Implementation Plan has been prepared in the spirit of the National Heritage Resources Act (No 25/1999) and the heritage management practice that has been nurtured within the ambit of this law. It adheres to internationally accepted principles of conservation of heritage. It is important to foreground the plan with an understanding of conservation in the international context in which the concept has evolved. Conservation is described in several conventions and charters of UNESCO and ICOMOS such as the World Heritage Convention (1972) and the Venice Charter (1964), the ICOMOS Burra Charter for Places of Cultural Significance (1999) and ICOMOS Nara Document on authenticity. These doctrines broadly resonate with each other on the fundamentals of conservation advocating

[2] Section 2(iii) of the National Heritage Resources Act (No 25/1999): "'conservation'', in relation to heritage resources, includes protection, maintenance, preservation and sustainable use of places or objects so as to safeguard their cultural significance;"

respect for the fabric and spirit of the place. Conservation means all the processes of looking after a place so as to retain its cultural significance.

3.1. The Burra Charter The Australia ICOMOS Charter for Places of Cultural Significance

South Africa leans heavily towards the *Burra Charter – The Australia ICOMOS Charter for Places of Cultural Significance* which itself draws inspiration from the Venice Charter. The Burra Charter recognises that conservation is a loaded word, *which may, according to circumstance, include the processes of: retention or reintroduction of a use; retention of associations and meanings; maintenance, preservation, restoration, reconstruction, adaptation and interpretation; and will commonly include a combination of more than one of these. Conservation may also include retention of the contribution that related places and related objects make to the cultural significance of a place. Conservation is predicated on a religious need retain its cultural significance.*

Within this broader definition of heritage these are the principles which will guide the restoration of the Bluestone Quarry Walls:

(i) **Preservation** means maintaining a place in its existing state and retarding deterioration.

The walls that are still standing at the BSQW site will be preserved in their original state with very little treatment necessary except that they will join and flush with the portions to be restored so that they form a single unit.

Figure 1: Sections of the wall that are standing and intact will be preserved

(ii) **Restoration** means returning a *place* to a known earlier state by removing accretions or by reassembling existing elements without the introduction of new material. A radical engineering proposal placing emphasis on the endurance of the wall (structural durability) though the introduction of a cement, grouting or geotextile reinforcement grid has been ruled out as untenable since the spirit and essence of the Bluestone Quarry Walls were that they were purposefully built without mortar as punishment.

Figure 2: Partially collapsed sections will be restored using the same material which has been displaced

(iii) **Reconstruction** means returning a place to a known earlier state and is distinguished from **Restoration** by the introduction of new material. In this project, reconstruction is necessary because the collapsed portions of the walls have lost material which cannot be recovered, yet this loss must be compensated. Additional suitable material has been identified and will be incorporated sympathetically to ensure that the original form and design of the walls are retained.

(iv) **Anastylosis** is a reconstruction technique whereby a ruined building or monument is restored using the original architectural elements (material) to the greatest degree possible. In the collapsed sections it is impossible to put back the stones in their original positions. While anastylosis may also involve disassembly of standing structures that may have been condemned as unstable, this is not the intention in this Implementation Plan. The target are walls that have collapsed and the debris (original constituent blocks) can be retrieved and recycled. In other words this process is to an extent a restoration since an attempt is made to put back the wall on the basis of existing photographs of the original wall and an opportunity that the material can be retrieved, although there is no guarantee that the building blocks will take back their original positions (Figure 3).

Figure 3: Collapsed section of the main wall, will be rehabilitated by anastylosis

3.2. The Nara Document on Authenticity

The Nara Document on Authenticity is an Addendum to the conservation doctrines which ICOMOS has passed, recognising that while international policy lays down the broad framework for conservation of heritage, it is necessary to respect local traditions/knowledge systems and circumstances. In other words the merits of decisions taken on heritage must be considered within the context of local conditions which are expected to vary from place to place and from time to time. *Conservation of cultural heritage in all its forms and historical periods is rooted in the values attributed to the heritage. Our ability to understand these values depends, in part, on the degree to which information sources about these values may be understood as credible or truthful. Knowledge and understanding of these sources of information, in relation to original and subsequent characteristics of the cultural heritage, and their meaning, is a requisite basis for assessing all aspects of authenticity.*

The involvement of EPPs who worked at the quarry and some of whom were involved in the construction and maintenance of the Quarry Walls is an important part of the ritual of replaying and presenting the intangible elements of the site (living heritage). The EPPs have already contributed to the body of knowledge on buildings techniques and their participation will be most treasured for their oversight (quality assurance) and adding value to the heritage. A number of them were brought back to Robben Island in the 2000s and organised into reference groups from which a corpus of data on the Blue Stone Quarry and Walls was collected. As the EPPs are now senior citizens the assignment of a social practitioner is to ensure that they can interface well with the project and their needs addressed as a special category of stakeholders. The involvement of EPPs is therefore one of the methodological tools underpinning the implementation of this project. They are at the centre of the project and the integrated approaches taken to manage all social opportunities presented by the project. This approach also resonates with the spirit of the Burra Charter: Article *4.1 Conservation should make use of all the knowledge, skills and disciplines which can contribute to the study and care of the place.*

Concerning the involvement of key stakeholders, part of Article 8 reads: "*Responsibility for cultural heritage and the management of it belongs, in the first*

place, to the cultural community that has generated it, and subsequently to that which cares for it."

4. RESTORATION AND RECONSTRUCTION TECHNIQUES

4.1. Types of Walls

In terms of morphology and outward appearance, two types of walls have been identified as follows:

(i) Freestanding wall

The main wall in the precinct which is a long dyke laid between the seashore and quarry is a freestanding wall, meaning that the two façades of the wall rise above the ground. The east facing side facing the quarry has a "skin" built by staking stones of different sizes and irregular shape, resulting in a coarse finish or texture (now called **P style**). Face stones are rarely laid in courses, and where an attempt at coursing is made they are short and occur haphazardly in the façade. They are called "false courses".

Figure 4: Example of P style wall

ACTION: In the planned restoration work the P style finishing of the façades will be imitated.

To our knowledge there is no photographic record of the form or appearance of the west façade of the main wall, i.e. the side facing the sea. In 2004 ex-political prisoners testified that the seaside face was built in the same way as the side facing the quarry i.e. with a “skin” of stacked stones in close resemblance to the south façade (Matenga 2004, p8). By then there was no trace of the façade, but a scree slope ending in the sea (Figure 5).

Figure 5: Scree of collapse facing the sea. It is possible that there was no wall on the seaside of the dyke.

ACTION: The matter as to whether there was a solid wall façade on the side facing the sea requires further consultation with EPPs and confirmation before a decision is made about what form it will take in the restoration/reconstruction.

(ii) Revetment and terrace walls

The rim of the quarry was stabilised by a semi-circular ring of revetment wall (east and north sides). The western and southern half of the rim is not protected. A revetment wall looks pretty much the same as a free standing wall described above, except that a revetment wall has one façade while the backside is filled up with soil and other material to create a terrace or platform. The revetment wall at

the site is broken by collapse into many sections and buried under soil wash in other sections (Figures 6-8).

Figure 6: Revetment wall can be seen in the middle ground.

Figure 8: One course of revetment wall exposed, the wall appears to be buried by stones and soil wash.

ACTION: The revetment wall will be traced under the earth/rubble cover. The process is an archaeological investigation in which minimum professional standards will be followed. When the wall has been exposed appropriate treatment procedures will be taken. One existing section of the wall is built with blocks of more or less regular size and demonstrates refined workmanship. This will provide guidance for the rehabilitation of this section of the revetment wall (Figure 8).

Figure 9: This revetment wall is of refined workmanship.

4.2. Stabilisation and reinforcement techniques

4.2.1. Battering and strengthening of the wall

The main wall will be reconstructed with a batter on the side facing east as was the case with the original wall, i.e. the in cross-section the walls leans slightly inwards (to the west). This technique lowers the centre of gravity which contributes significantly to the stability of the wall.

Overall, the building plan entails introducing large stones with incremental size from the centre of the breadth of the wall towards the sea. In other words the size of the stones to be deployed increases in size with increasing distance towards the sea from the centre. There are very few stones of this size in the debris (Figure 9). The weight of the individual stones required for the purpose is yet to be determined in terms of the minimum and maximum sizes. The stones will be laid in such a manner as to integrate well into the wall so as to main visual integrity and avoid obtrusion (Figures 10).

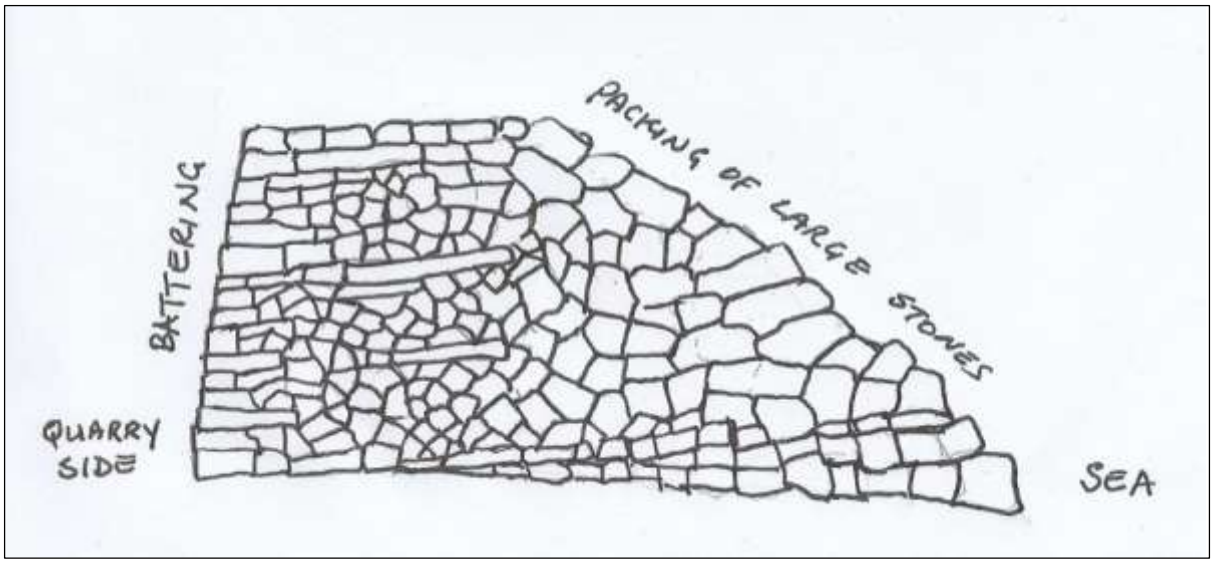


Figure 10: Cross-sectional drawing shows the proposed structural design of the wall. (i) Battering is the leaning inwards of the wall which has the effect of lowering the centre of gravity in the wall. (ii) Careful stacking of stones that make the façade facing the quarry (left), (ii) Core of the wall has occasional transversely laid tie stones (iii) In the defensive skin (right) facing the sea, large blocks are laid with size increasing from the centre of the wall as we move towards the sea façade.

There was no wall or skin on the side facing the sea. Instead a gentle slope had been created towards the shoreline, which may be described as a “scree slope” (Figure 11).

Figure 11. Stock image of a natural scree slope

4.2.2. Introduction of tie stones

The Blue Stone Quarry Wall falls within a masonry typology called three-leaf walls meaning that they are composed of two external leaves making up the two façades of the wall and an internal core of relatively poor mechanical strength made up of loose stones including sand. There is one deviation though that the BSQW has only one external leaf, the other side being a stabilised scree slope. Lack or loss of bonding between the leaves is typical of most masonry structures. Generally the problem of lack of bonding results in detachment of the leaves leading to collapse even under normal conditions (i.e. discounting the action of the sea). . In the case of the BSQW sea action washed out the sand infill thereby creating voids which inevitably resulted in weakening of the structure over time. This calls for the development and practice of conservation and repair solutions to reach an optimum threshold of compressive strength and stability taking into account the exposure of the wall to tidal pressure from the sea. Intervention must be kept at the minimum but at least providing sufficient strength to the wall.

Traversal tying of the leaves is one of the intervention techniques preferred. The aim of tying is to promote or improve the bond between leaves by directly connecting them. It helps to reduce the chance of brittle collapse mechanism (the physical separation of the leaves), as well as limiting the transversal deformation of the wall. However given that the breadth of the wall is 7m it will be difficult to find tie stones that can span the entire breadth of the wall. However tie stones as long as possible can be laid at suitable intervals or in random positions bonding one external leaf and the core leaf.

4.2.3. Strengthening the bond between the external leaf (skin) and the core

Apart from the introduction of tie stones, during reconstruction, the building blocks of the external leaf (skin) and core must be laid in such a manner that they are efficiently interlocked laterally (lateral bonding). This will depend on the shape and irregularity of the stones used. As a bottom line efficient bonding between the external and the core can guarantee better global structural performance (Figure 8-9). There are at least two important compression forces acting on the wall. Vertical compression arise from the sheer weight of the packing and in a three-leaf masonry structure, poor interlock between the leaves promotes an out-of-plane

behaviour that may induce the vertical instability of the leaves (Poisson effect). Downward compression create forces that act perpendicular to the direction of the compression (i.e. laterally), pushing out the skins.

The second compression force comes from the sea. Generally the sea will exerts a horizontal thrust against the northern face of the wall, although in fact the action of the waves may generate other local tidal forces in multiple directions. Tie stones will improve endurance as they can efficiently deflect the compression of the waves as the force will be acting on a narrow surface. On the other hand since the embedded tie stones are laid along the direction of the compression, they can also better withstand the rotational forces generated by the waves which can destabilise the wall.

4.3. Compensation of material that was washed away

The washed out finer materials cannot be recovered. Even if this material could be retrieved from the sea, the integration of materials of significantly different sizes is not advisable as this can potentially destabilise the walls due to the poor bonding/cohesion that can be achieved. There is lot of redundant but suitable stones especially along the shore and close to the BSQW which can be selected for recycling into the wall.

Furthermore a supplier of material suitable for the restoration of the façade wall has been identified on the mainland.

The introduction of new materials to strengthen and stabilise a historic structure is generally acceptable as a conservation strategy. The Burra Charter urges a precautionary principle *based on a respect for the existing fabric, use, associations and meanings. It requires a cautious approach of changing as much as necessary but as little as possible* (Article 3.1 of the Burra Charter).

4.4. Reconstruction of the main wall: Determining the width of the wall

The underlying conservation principle is restoration by reconstruction; as far as possible the wall will be restored to its original form. A ground survey will determine the average dimensions were of the various sections of the wall. This information possibly can be obtained from the testimonies of the reference groups photographs. The intention is as far as possible to restore the wall to its original form.

The main wall was wider at the ends and gradually narrowed towards the middle section where the two building spans met to cut off the sea from the working area. The question arises, whether a similar structure should be reconstructed, narrower in the midsection, which happens to be the first section breached by the waves. It has been determined that the breadth of the wall in the section where the experimental wall will be constructed was at least 7m at the bottom, measured from the eastern skin to the mean high tide line.

ACTION: The Experimental Wall will be constructed with a foundation breadth of 7m. However decision about the breadth of the rest of the wall requires consultation with stakeholders and EPPs.

4.5. Mitigating the impact of climate change on tidal patterns

Climate change and its impact on various natural phenomena such as weather patterns and tidal behaviour of the oceans has become a matter of global concern. What used to be freak events are happening all too often to raise public concern. For instance while the waves opened 15m in the wall over a period of just over 2 decades (1977 to 2002), in 15 years between 2004 and 2019 the gap increased more than five-fold to 82 m.

Measures that have been proposed to strengthen the wall are not absolute proof against the compressive force exerted by the sea at high tide. That the sea has been the greatest threat to the Bluestone Quarry Walls from the time of their construction is not a secret. In fact it was part of the scheme that the wall would be attacked by the sea, which required the prisoners to put in place a regime of maintenance. The frequent tidal breaches which have been experienced in the

last 20 years is clinical evidence of epic climatic shifts, which compel us to plan for a worst case scenario. The worst case scenario is that we are likely to experience worse tidal events, which calls for appropriate measures to be taken.

ACTION: Placement of a line barrier of large stones a short distance offshore to dissipate the power of the waves. Ideally use the same material as the building blocks of the wall, i.e. dolomite.

Alternatively, this mitigation plan can be considered following a period of monitoring of the waves (24 months). Such a decision must be reached with full consultation of stakeholders and heritage experts.

5. ENVIRONMENTAL CONTROL

RIM will appoint an independent Environmental Control Officer for on-site monitoring compliance with environmental species, taking into account the fact that this area is a sensitive habitat of sea gulls and penguins.

ACTION: RIM Infrastructure and facilities.

6. HEALTH ALERT

The project resumes in the backdrop of the Coronavirus pandemic. The precautions taken in response to this health threat are in line with national guidance and RIM protocols to control the spread of the pandemic. A Covid Management Plan has been prepared.

ACTION: AHSA will prepare and submit a site Health Plan.

7. IMPLEMENTATION SCHEDULE

We tend to be cautious in not providing long-term timeframes in view of several variable factors, of which some will create circumstances that might be beyond our control. Our planning therefore tends to be short term, expecting the Plan to be updated once the uncertainties have been cleared.

PHASE	JOB DESCRIPTION
Phase I:	Reconstruction/restoration of the experimental wall 5m long on the eastern end of the breached section.

Phase II	Complete reconstruction/reconstruction of the breached section (c. 82 m long).
Phase III	Construction of the north face of western wall (82 m long)
Phase IV	Repair damaged sections of the standing wall.
Phase V	Repair of the Quarry Revetment ring walls

8. TASKS SCHEDULE

DATE	TASK	RISK MANAGEMENT	ACTION/STATUS
7 Oct 2019	Inception meeting & Site Visit	-	
6-10 Nov 2019	Mapping and condition survey of walls	Health & Safety plan being prepared	AHSA
		Environmental Dept / ECO to point out controls (flora and fauna)	Environ Dept. /ECO
Jan – March 2020	Consultation with EPPs & Institutional Stakeholders	Social distancing introduced to control COVID19 Pandemic Communication by telephone and email	RIM / AHSA
Sep 2020	Archaeological investigation of footprint of proposed Experimental Wall. Screening of construction material (quality & quantity)	Health and Safety Plan (PPE)	AHSA
		Environmental Monitoring	Environ Dept. /ECO
Sep – 31 Oct 2020	Construction of Experimental Wall	Health and Safety Plan (PPE)	AHSA
End of Phase I		Environmental Monitoring	Environ Dept. /ECO
		Weather conditions	
1st wk, Nov 2020	Workshop Evaluation of Experimental Wall	-	-
2nd wk, Nov 2020 - April 2021	Reconstruction of 77m wall	Health and Safety Plan (PPE), COVID-19	AHSA
		Environmental Monitoring	Environ Dept. /ECO

End of Phase II		Weather conditions	
May – June 2021	Construction of the north face of western wall (82 m long)	Health and Safety Plan (PPE), COVID-19	AHSA
End of Phase III		Environmental Monitoring	Environ Dept. /ECO
July 2021	Repair damaged sections of the standing wall	Health and Safety Plan (PPE), COVID-19	AHSA
End of Phase IV		Environmental Monitoring	Environ Dept. /ECO
		Weather conditions	

9. SUPERVISION

	POSITION	RESPONSIBILITIES	NAME
1	Director	Overall responsibility	Dr Edward Matenga
2	Manager	Coordination (office)	Mr Rofhiwa Makhado
3	Field Supervisor	Field supervision in archaeology & heritage	Senior Mason
4	Lead Mason	Construction	Mr R. Mathomu
5	Social Facilitation & community meetings	Social Facilitation & Stakeholder issues	Ms Phindile Khumalo
6	HSE Specialist	Health Safety & Environment	Mr Lebohang Mposho
7	Helpers	Fieldwork	Local recruitment

10. JOB DESCRIPTIONS

	TASK DESCRIPTION	ACTION
1	**Continuous stakeholder consultation and engagement in accordance with the MOU**	Ms Phindile Khumalo
	(i) Social practitioner will prepare a stakeholder engagement plan and implement a continuous social engagement process.	
2	**Role Director**	Dr Edward Matenga
	(i) To ensure that the project is executed in accordance with the National Heritage Resources Act (No 25/1999), supporting regulations and Operational Guidelines for the Implementation of the World Heritage Convention. (ii) Supervision of the Masons, providing mentorship and training for local helpers / interns and ensure that quality of work satisfies minimum professional standards. (iii) Must conduct regular inspection visits. (iv) Will be called on site if an emergency situation arises (v) Must write and submit technical reports.	
3	**Lead Masons**	Mr R. Mathomu
	(i) Reconstruction, Restoration and Repair of walls (ii) Assist in archaeological screening of the area. (iii) Screening and selection of suitable construction material. (iv) Keeping master register/diary of events at the site. (v) Keeping a register of finds from construction works (artefact recording form or accession register Keeps a register of finds from archaeological salvage from topsoil discard (vi) Supervision of helpers recruited from the local communities	
4	**Health Safety and Environment**	Mr Lebohang Mposho
	(i) Identify HSE conditions and risks. (ii) Adjustment of conventional approaches to accommodate COVID-19 infection risk. (iii) Induction of all field stuff (iv) Keep a record of all incidents relating to HSE (v) Risk assessment and making recommendations for mitigation and remedial action	
5	**Helpers**	
	(i) Reconstruction, Restoration and Repair of walls under supervision (ii) Assist in archaeological screening of the area under supervision (iii) Screening and selection of suitable construction material under supervision. (iv) Keeping master register/diary of events at the site.	

11. IMPLEMENTATION SUPPORT

EQUIPMENT

1st AID KIT	PERSONAL PROTECTION EQUIPMENT (PPE)	TOOLKIT	DOCUMENTATION	HEALTH & HYGIENE	TRANSPORT/ SHELTER/ SITE OFFICE
Standard kit	Helmets Impact goggles Overalls Industrial safety shoes Gloves Reflective vests Barrier tape	Hammers Chisels Crowbar Picks Shovels/spades Trowel Buckets Plastic bags (finds) Cord Pegs	Tape Measures Camera Video camera Audio tape recorder GPS Notebooks	Portable water Temporary toilet Waste bags COVID-19 kit (Infra-red thermometer, sanitizers, face masks)	Passenger van Tent Table/Chairs