



MANDELA MINING PRECINCT  
MINDS FOR MINES



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# Mandela Mining Precinct

A programme of the Department of Science and Innovation and the Minerals Council South Africa, hosted and managed by the CSIR and the Minerals Council.

## TERMS OF REFERENCE (TOR)

### Longevity of Current Mines (LoCM)

### LoCM21WP7 – Current Mining Longevity into Future Mining Sustainability

Document number: LoCM 2021 WP1 TORv1

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## **1. EXECUTIVE SUMMARY**

The focus of the Longevity of Current Mines (LoCM) Programme is to modernise and introduce new solutions to current gold, chrome and platinum mines with Best Practice methods and procedure outcomes. Recent scope has also focussing to include environmental, water and energy impact to current operations facing near future closure with high cost liabilities, effecting future mining sustainability.

The 2021/22 FY budget year programme consist of resource extraction optimisation projects and some technology application projects, in which the focus is to either establish remote control functioning within the production activities, and also enhance electronic management systems, where improved effective measures and control systems are utilised. A recent addition is the focus of a collaborative approach between industry, stakeholders and government to seek mutual solutions in turning liabilities and expenses into assets.

The (LoCM) 2021-2022 programme includes the following work package, namely:

- Current Mining Longevity into Future Mining Sustainability (mines nearing closure turn into assets)

## **2. BACKGROUND AND RATIONALE**

The Mandela Mining Precinct is a collaborative private-public institution established as a direct outcome of the mining Phakisa. This is carried out through the South African Mining Extraction Research Development and Innovation (SAMERDI) strategy. The SAMERDI strategy is missioned to improve the contribution of Research and Development (R&D) and innovation in the mining sector. The environmental impact and liability, water supply and energy demand is not new challenges to the industry, but in addition the project seeks a collaborative solution or solutions to reduce anticipated costs associated with mine closures in converting to assets to benefit future mining. The outcome of the project is to have a three phased approach, phase I to identify and analyse the problems, phase II to define the solution/s develop a strategy and execution plan and phase III the implementation and monitoring of the solution strategy plan.

## **3. AUDIENCE AND USE OF FINDINGS**

The Mandela Mining Precinct and its stakeholders shall be the principal recipients of the research outcomes. In general, the Precinct shall utilize the findings to inform the various work streams of the SAMERDI programme.

The Mandela Mining Precinct shall be the principal recipients of the research outcomes. In general, the Mandela Mining Precinct shall utilize the findings to inform the various work streams of the SAMERDI programme. As the focus will be on 'real' industry 4IR needs, as related to people, there will be a move to some technology enablers for demonstration, for potential transferability of solutions, for industry use/business improvement opportunity.

Specific uses include, but are not limited to:

- Inform the SAMERDI Programme work streams of the impact of people and behaviour related factors in the solution process;

- Identify key insights from completed projects and share findings with stakeholders (through workshops, website, etc.);
- Recommend guidelines, frameworks, strategies or make recommendations for further pilot/customisation or potential implementation in industry;
- Demonstrate technology enablers for potential industry use.

#### **4. RESEARCH SCOPE**

Mandela Mining Precinct is searching for a service provider to establish a scope of work for Future Sustainable Mining, in particular looking at how the programme can create 'sustainable businesses for collective value'.

This work is focused on the PGM, Au, and Chrome industries, and broadly includes the following critical challenge areas:

- Environmental liabilities;
- Future sustainable operations regarding carbon footprints;
- Energy optimisation and management;
- Water consumption and management

The scope of work includes a phased approach, consisting of three phases. The first phase (PHASE I) is about understanding the problem which is established through desktop research, interviews, and workshops to get a clear view of what the highest collective problems are to be actioned as priority.

Follow-on to this work (PHASE II) is to define the solution processes, in which to develop a strategy, deliverables and execution plan to address the problems identified in PHASE I.

The final process (PHASE III) is the implementation and monitoring process, which is the execution of the delivery plan, test the outcome of delivery plan and establishing a framework of feedback and learning to ensure future sustainability.

#### **5. OBJECTIVES**

This LoCM project aims to achieve the following:

- Established baseline understanding of the problems through research, interviews and workshops, which include but not limited to: (Phase I)
  - Industry criteria, needs and requirements;
  - Established legislative requirements and trends;
  - Obtain economic and commercial trends;
  - Case studies for successful applications;
  - Documentation of findings
- Established solution strategy, by analysing information obtained in Phase I, which include but not limited to the development of: (Phase II)
  - A strategy;
  - Deliverables; and
  - Execution plan
- Established implementation plan, which include but not limited to: (phase III)

- Testing and monitoring preliminary implementation of execution plan,
- Findings report to obtain industry support and approval,
- Guideline and roll-out plan,
- Implementation and execution sustainability

## **6. RESEARCH QUESTIONS**

A preliminary set of research questions may include, but not limited to:

- What is the current and future liabilities at present towards the four critical challenge areas?
- What frameworks exist and what gap analysis are available on these four areas?
- What action plans exist and does these cover all criteria and requirements?
- What collaborative processes need focus to align legislation requirements, implementation and execution?

## **7. SUGGESTED RESEARCH METHODS**

While the researcher is invited to suggest a combination of research methodologies and specific techniques, at least the following will be required:

- To conduct a desktop research/survey, industry reviews and workshops that covers:
  - the understanding of the problems, need, criteria and requirements;
  - Legislation requirements and trends;
  - The impact of economic liabilities and costs;
  - Case studies
- Conduct analytical comparisons of information and establish a base line of understanding of the problems and associated economic liabilities
- Document findings and establish scenarios for a solution strategy, deliverables and execution plan

## **8. ETHICS AND RISK**

In order to deliver relevant research that is undertaken in an ethical and replicable manner, it is critical that the researchers receive ethics clearance from their respective organisations, and that this is signed off prior to research commencing. If no ethics clearance is required it should be noted and communicated as such.

Due to the nature of the research work within the LoCM programme it may be required to include underground trails, surface trails or other interaction with Mining houses. The responsible research institution will be accountable to ensure that if any Non-disclosure agreements are required, that it is put in place.

It is further suggested that due to the COVID-19 associated risk that mitigating plans should be included within the project proposal, which would identify which deliverables/milestones could potentially be affected by a change in any lockdown level and alternative action that could be taken in those instances.

## **9. KEY STAKEHOLDERS**

A number of stakeholders should be engaged through this process, based on their relationship with the SAMERDI Programme. The set of stakeholders should include, but is not limited to, the following:

- The selected mining firms, and the relevant operations;
- The Mandela Mining Precinct;
- The SAMERDI Programme Managers (within the Mandela Mining Precinct)
- Minerals Council South Africa
- The Original Equipment Manufacturers Forum

The researcher will be required to develop a comprehensive stakeholder list and map, together with associated influence and importance.

## **10. REQUIRED RESEARCH OUTPUTS**

The key output for this project is a written document that clearly answers the research questions and deliverable identified above.

In addition, a guideline to the solution strategy and implementation plan, as well as a summarised presentation deck that captures the key insights from the comprehensive written document.

The key output for this project is a written final report on the Mandela Mining Precinct template.

In addition, the following will be required on the Mandela Mining Precinct template:

- Inception report;
- Draft final report: Technology solutions identification, demonstration, review and recommendations;
- Monthly progress reports;
- Milestone reports;
- A summarised presentation deck and close-out report that captures the key insights from the final report.

In terms of stakeholders/ project information-share:

- Arrange stakeholder and expert sessions for project inputs, information-share and progress updates;
- Provide project presentations as needed (TSCs, Open Day, Workshops, Progress meetings, Conferences/Seminars);
- Provide an article, on the project, ready for public access through the Mandela Mining Precinct website;

In terms of the LoCM Technical Steering Committee (TSC):

- Work closely with TSC Project Stream lead to obtain project guidance, advice, support and access to sites/mine employees.

## 11. TIMETABLE

The PHASE I of the project is to start 1 September 2021 and be completed by 15 March 2022, which includes review of all documents by the TSC members and administrative processes. The following table is a guide to the milestone deliverables, which can be changes according to the expertise of the researchers.

**Table 1 – Milestone deliverables for Phase I**

Milestone	Deliverable	Timeframe	Format
1.	Project initiation - A start-up presentation detailing project intent - Identification of a champion mine and alternatives	1 Nov 2021	Project Plan
2.	Desktop research: - To cover all four topic areas; - Duration 6 weeks	15 Dec 2021	Research Report
3.	Host Interviews: - Host a minimum 20 interviews within and outside mining, - Duration 4 weeks	11 Feb 2021	Findings report
4.	Host workshops - Host at least 9 workshops for a minimum of 1,5 hours which include industry representatives, knowledgeable professionals, legislation enforcement representatives: - An executive focused workshop, providing strategic view and validate operational needs and constraints; - Operational management level focused workshops to determine collaborative compliance and implementation plans; - Third party focused workshops to understand external environments, requirements and challenges; - Duration 5 weeks	18 Mar 2021	Capture workshop discussions and present report on conclusions and recommendations
5.	Document Final Report - Consolidation of information obtained into a strategy plan - High level implementation plan - Structured proposal for implementation with deliverables.	12 Apr 2022	Final Report

The timetable is governed by the following, and is to be included in detail with the proposal:

- Detailed chart to be included, detailing deliverables, milestones and tasks
- Final report due 22 April 2022

## 12. RESEARCH MANAGEMENT

- The LoCM programme manager is accountable for the final delivery of this project, and will review and approve the quality of and payment for deliverables and milestones.

- A Project lead to be identified who will liaise with the programme manager on project progress and status.
- Progress/status reports by the project lead shall be provided to the LoCM Programme Manager every two weeks on an agreed schedule
- Face-to-face meetings will be held once a month on an agreed schedule, at the Mandela Mining Precinct or a mutually agreed venue.
- Payment for the project is according to milestones, to be included in the detailed proposal.
  - Proposal and project plan, with detailed costing, including milestone deliverables;
  - Monthly progress reports;
  - Demonstration of recommended technology solution;
  - Draft and final report.

### **13. COLLABORATION AND SUB-CONTRACTING**

- Collaboration is required amongst research partners (universities and CSIR) based on capability, and availability of expert resources within the institution;
- Collaboration partners will nominate a lead partner based on the expertise and capability to lead and deliver on the project;
- Project deliverables per collaboration/sub-contracting partner will need to be outlined, with associated detailed costs.
- **The Lead Partner will need to sub-contract with relevant training suppliers/OEMs. This is to be done during project inception;**
- Criteria for OEM selection for sub-contracting needs to be clearly articulated, and provided in the inception report. A fair and transparent identification, evaluation and selection process needs to be done prior to sub-contracting with selected suppliers.

**POTENTIAL CRITERIA MAY INCLUDE (BUT NOT LIMITED TO):**

Criteria	Comment	Score 1-3 0= No/None 2=Partial/Acceptable 3= Yes
1. Is the supplier an MQA certified and accredited provider? Or Is the provider a mine selected provider (procured through mine selection and procurement processes)?	Eg. Strict on-mine procurement regulations and processes followed	
2. Has the required solution been developed by the supplier – so that design and development costs do not have to be incurred?		
3. What is the position of the supplier in the industry – is the required solution being used in industry, in Au/PGM or Coal sectors?		
4. Does the quality and specifications of the solution meet mining modernisation skills needs requirements?		
5. Does the solution reflect technical capability/expertise in design to support addressing of modern mining skills needs?		

6. Does the solution meet the industry need (as per this project need)?		
7. Is the solution cost effective – in that will it allow for ROI for the company? How?		
8. Does the Supplier training and development team consist of HDSA members for knowledge transfer/capacity building?		
9. Is the Supplier sponsoring/supporting any mining related community programmes/projects?		
Total		

**\*TO NOTE: THE SELECTION SCORE SHEET NEEDS TO BE INCLUDED IN THE INCEPTION REPORT, WITH SELECTED SUPPLIERS CLEARLY INDICATED.**

## **14. QUALIFICATION AND EXPERIENCE REQUIRED**

Due to the technical inputs required for the project, ideally a senior researcher who has the relevant experience and skills in the relevant field of science will lead this project.

- Subject matter expertise;
- Research and development expertise;
- Research report writing expertise;
- **Capacity building:** An Honours/Masters/Doctorate level student must be included in the project. The project (or a part thereof) should ideally form a part of the student's Honours/Masters/Doctorate studies.