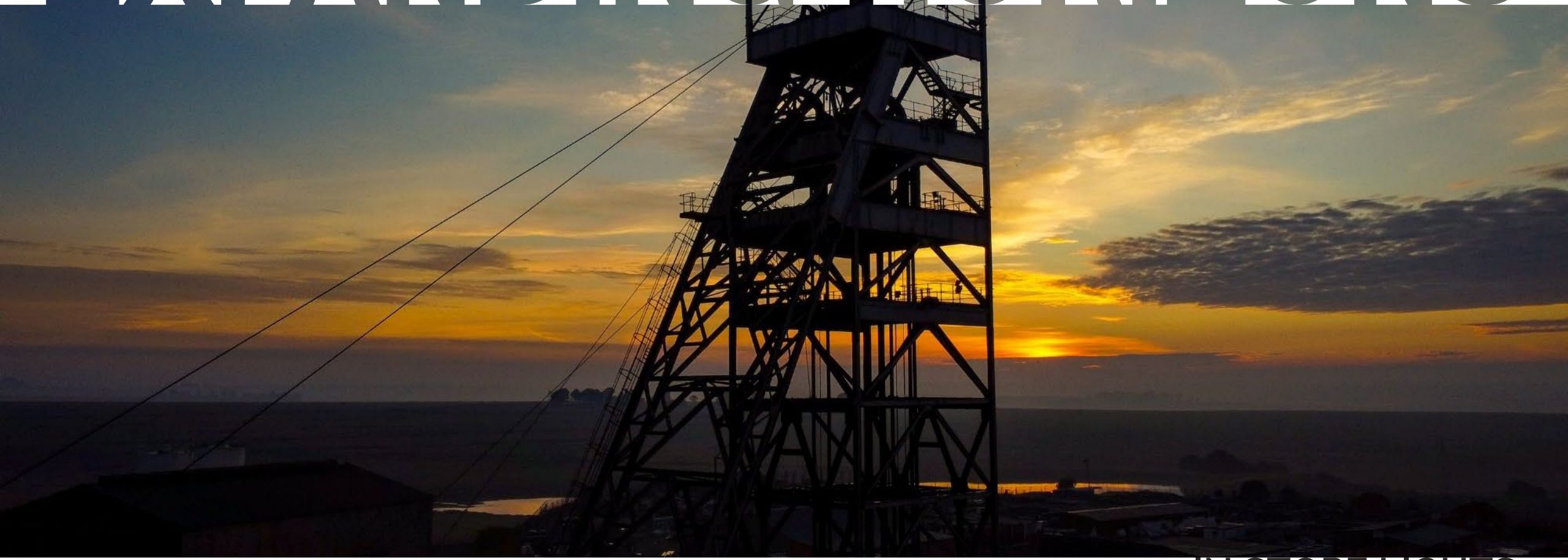
EVANDER MINES

PAN AFRICAN RESOURCES

EXPANDING HORIZONS



IN STOPE LIGHTS

Implementation and Adoption challenges

OTCQX: PAFRF/PAFRY | AIM: PAF | JSE: PAN

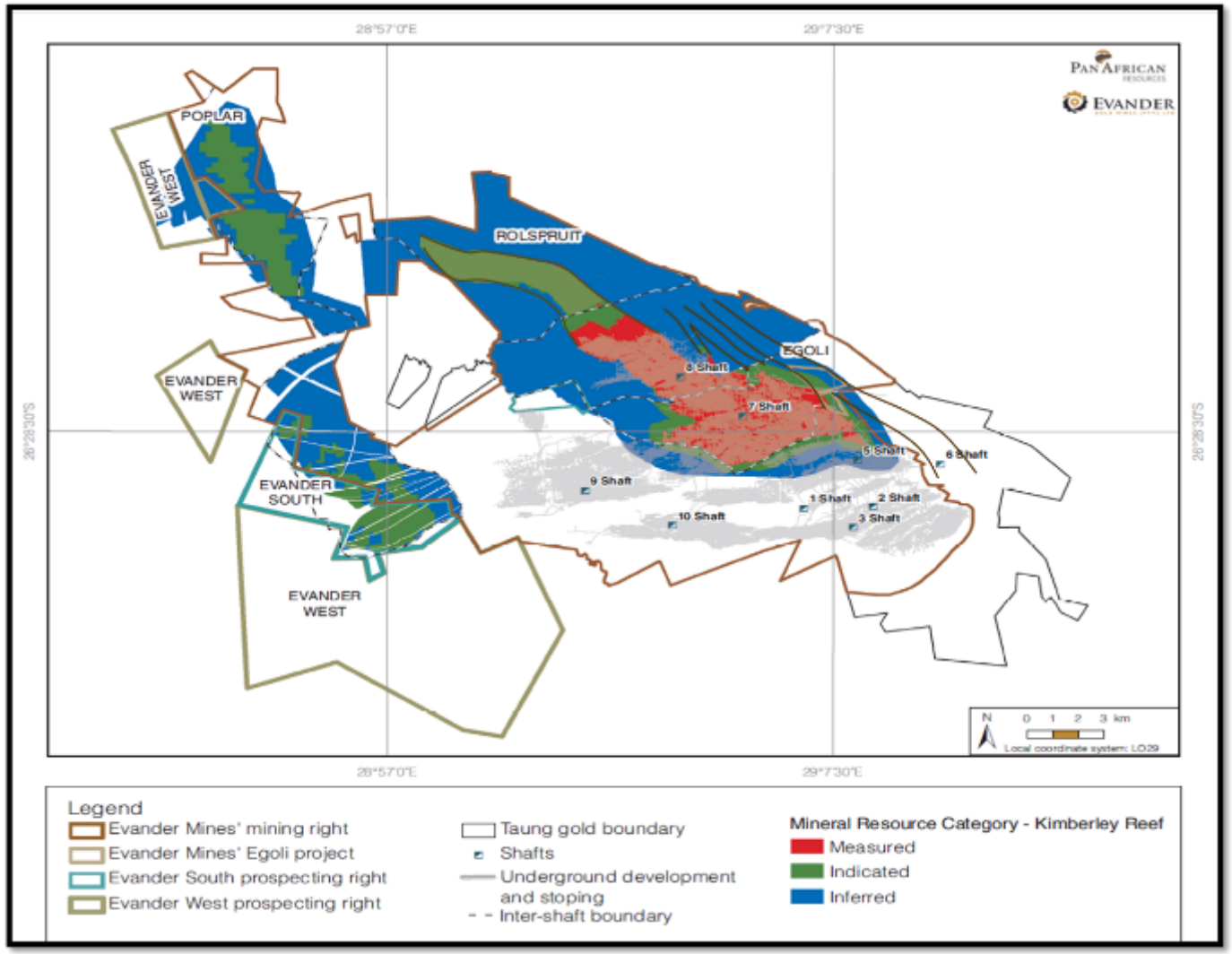
OVERVIEW OF THE IMPLEMENTATION OF IN-STOPE LIGHTING

- Introduction - EGM
- Safety performance - FOG related incidents
- Strategic intervention on in-stope lighting
- Implementation status : progress to date
- Challenges identified with the implementation of in-stope lighting
- Underground lights - pictures
- Key learnings
- Roles & Commitments
- Way forward
- Conclusion

INTRODUCTION

EDWIN MOLEKO – MINE MANAGER

OVERVIEW- EVANDER GOLD MINE



Evander Gold Mine, **located in Mpumalanga, South Africa**, and owned by Pan African Resources, operates high-grade underground mining and surface tailing retreatment. The operation focuses on the Kimberley Reef and is known as one of the region's lower-cost gold producers, with a significant life-of-mine extended by projects like the 8 Shaft pillar and 24 Level development. Pan African Resources +4

Key Details of Evander Gold Mine:

- **Operator:** Pan African Resources (PAR), which acquired the operations from Harmony Gold in 2012.
- **Location:** Near the town of Evander, Mpumalanga, South Africa.
- **Mining Operations:** The mine has shifted focus towards more sustainable methods, including:
  - **8 Shaft Pillar & 24 Level:** Underground mining focusing on high-grade pillars and deeper-level development.
  - **Elikhulu Tailings Retreatment:** A large-scale project that re-processes older tailings dams for gold, providing a low-cost, long-term operation.
- **Production & Life of Mine:** The 8 Shaft project adds approximately 65,000 oz/year, with ongoing developments extending the mine's life beyond 10-14 years.
- **Employment & Community:** The mine has gone through restructuring, including significant retrenchments in 2018 to ensure financial sustainability. It also runs training programs, such as the Competent B training initiative, for the local community.
- **Sustainability:** Focuses on safety, water efficiency, and reducing environmental impact through modern tailings management. Pan African Resources +6

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PAN AFRICAN RESOURCES

SAFETY PERFORMANCE

NHLANHLA PHAKATHI- SHEQ MANAGER

SAFETY PERFORMANCE – FALL OF GROUND (FOG) RELATED INCIDENTS

Safety Performance Overview: FOG

FOG remains one of the **top critical risks** within underground operations:

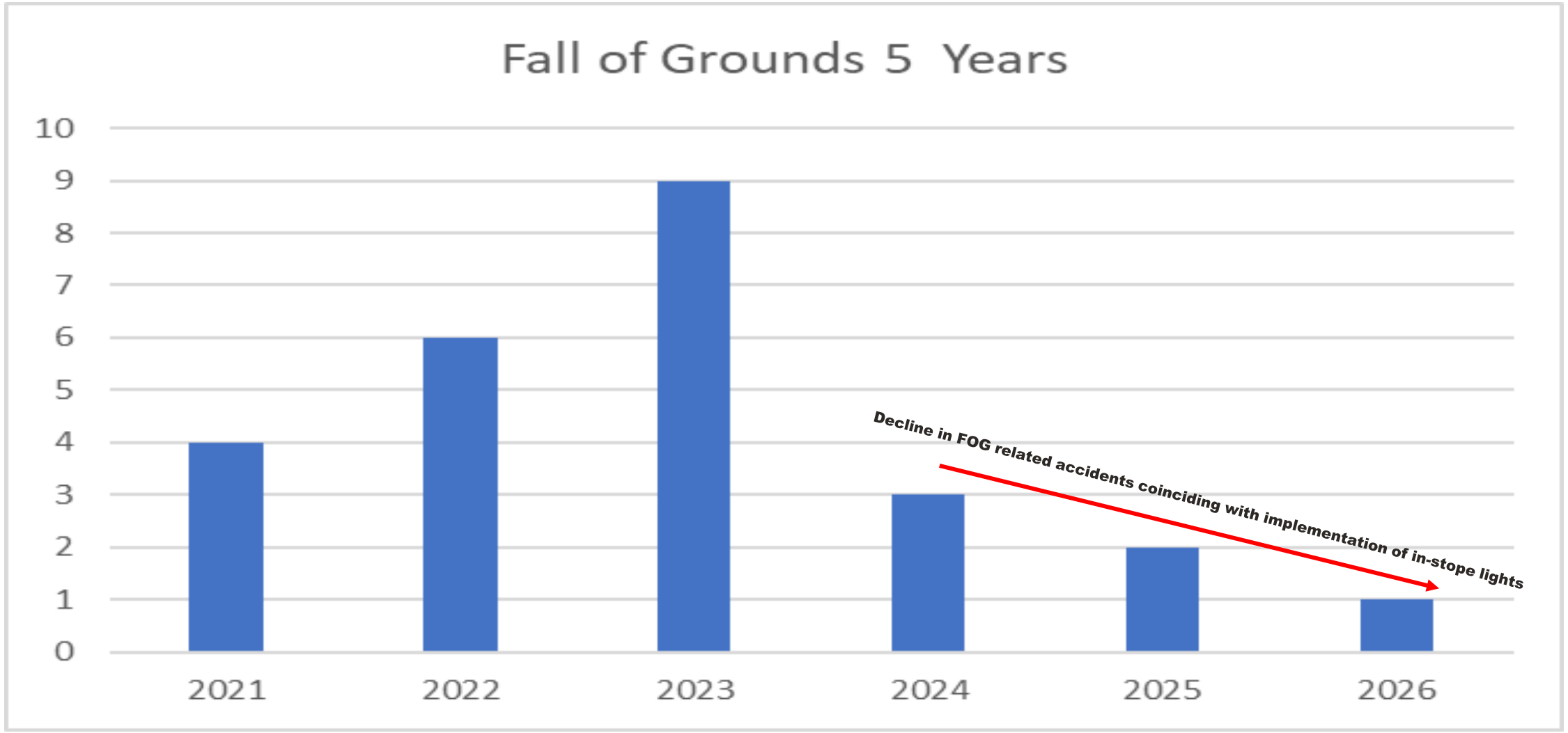
- 14 July 2025: Fatality recorded due to Fall of Ground incident (FOG in centre raise)
- 20 February 2026: Serious injury recorded due to Fall of Ground (Strain burst in Shales)

Majority of incidents linked to:

- Poor visibility in stoping areas
- Inadequate barring and examination practices
- Non-compliance to support standards
- Behavioural factors and shortcuts

Despite existing controls, visibility constraints and inconsistent application of safe work practices continue to contribute to FOG incidents.

CONT: SAFETY PERFORMANCE - FALL OF GROUND 2021-2026 YTD



This positive trajectory reflects the impact of targeted safety interventions, most notably the implementation of in-stope lighting as a key engineering control to address visibility challenges at the working face.

STRATEGIC INTERVENTION

MICHIEL FOURIE- CHIEF ELECTRICIAN

STRATEGIC INTERVENTION: IN-STOPE LIGHTING
WHY UNDERGROUND LIGHTING?

The introduction of in-stope lighting is critical engineering control aimed at addressing one of the key contributing factors to Fall of Ground (FOG) incidents—**poor visibility at the working face**.

Underground mining environments are inherently high-risk, with no natural light and complex geological conditions. Reliance on cap lamps alone has proven insufficient in ensuring optimal visibility for safe work execution.

- Further studies have shown the following:
  - Dark environments increase fatigue and the risk of injury.
  - Underground environments with insufficient or no light can compromise alertness, concentration, productivity, and cognitive function.
  - Low light workplaces can disrupt circadian rhythm, leading to short term issues such as sleep deprivation, depression, a weakened immune system, substance misuse (alcohol and drugs), and insomnia.
  - Extended exposure to minimum light increases vulnerability to issues such as eye strain, light sensitivity, and depression.

- **To improve workplace visibility for better hazard identification, enhanced safety performance and increased work efficiency.**

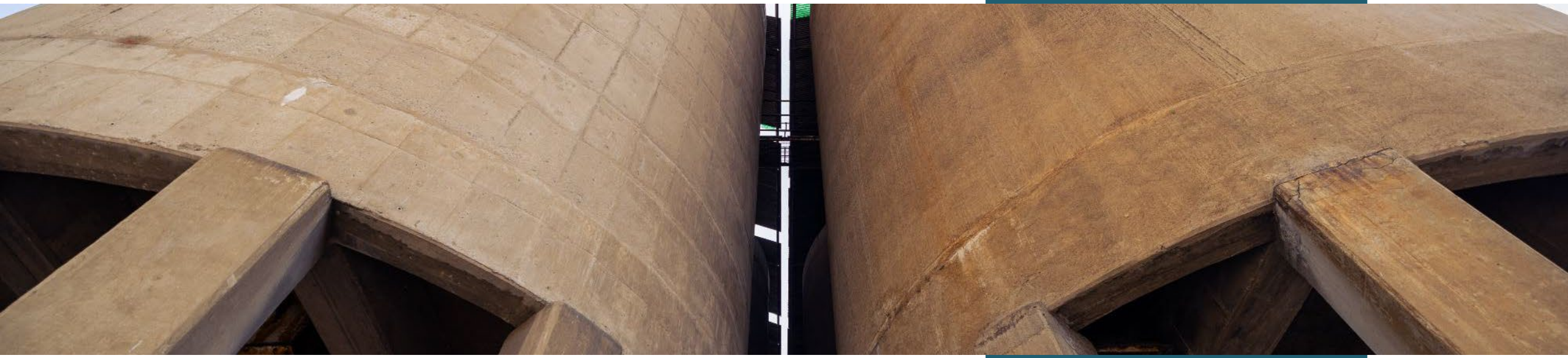
- **When combined with the MOSH entry examination, this will serve as an effective tool to improve hazard recognition, identifying loose rocks, slippery footwall, panel marking, and the installation of. It will also promote better footing to prevent slip and fall.**

CONT: STRATEGIC INTERVENTION ON IN-STOPE LIGHTING

To address visibility-related risks, the mine has initiated the implementation of in-stope lighting as a key engineering control.

- Objectives:
  - Improve visibility at the working face
  - Enhance the quality of barring and examination
  - Enable early identification of loose ground
  - Reduce reliance on handheld cap lamps as a primary light source.

IMPLEMENTATION STATUS



IN- STOPE LIGHTING IMPLEMENTATION STATUS - PROGRESS TO DATE

Implementation Progress – In-Stope Lighting

- **Pilot Sections**: Identified and equipped with in-stope lighting at the 7 Shaft Training Centre
- **Installation**: Completed at Pilar Section on 16 Level, now progressing to 24 Level
- **Standards & Procedures:** Specifications for in-stope lighting have been developed and approved
- **Training & Awareness**: Ongoing training provided to crews on the use and benefits of in-stope lighting.

Additional Progress:

- In-Stope Champion: Appointed to drive adoption and compliance
- Change Management Phase: Completed successfully
- Execution Phase: Currently in progress**.**

Overall Status:

Evander Mines is at **55%** completion, progressing according to plan.

EVANDER MINES

PAN AFRICAN RESOURCES

CHALLENGES IDENTIFIED

CHALLENGES IDENTIFIED

- Resistant to change
- Availability of stock
- Discipline
- Maintenance
- Training
- Accountability

EVANDER MINES

PAN AFRICAN RESOURCES

UNDERGROUND LIGHTS

NEW CONCEPT MINING IN STOPE LIGHTS

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Rockstop LEDs Stock Codes

NCM CODE: **WBLEDPSUPPLY**
LED Power Supply

Stock Code: 514497075

NCM CODE: **WBLEDEXT30M**
3x 10m Extension Cables

Stock Code: 564156026

NCM CODE: **WBLEDDC05**
6x 0.5m LED Lights &
0.5m Connecting Cables

Stock Code: 532110136

NCM CODE: **WBLEDCONN**
Connector Transformer T-Piece

Stock Code: 572132233

NCM CODE: **WBLEDSTPIECE**
ASG Short T-Piece

Stock Code: 572132232

NCM CODE: **WBC0042**
LED Clip

Stock Code: 532110137

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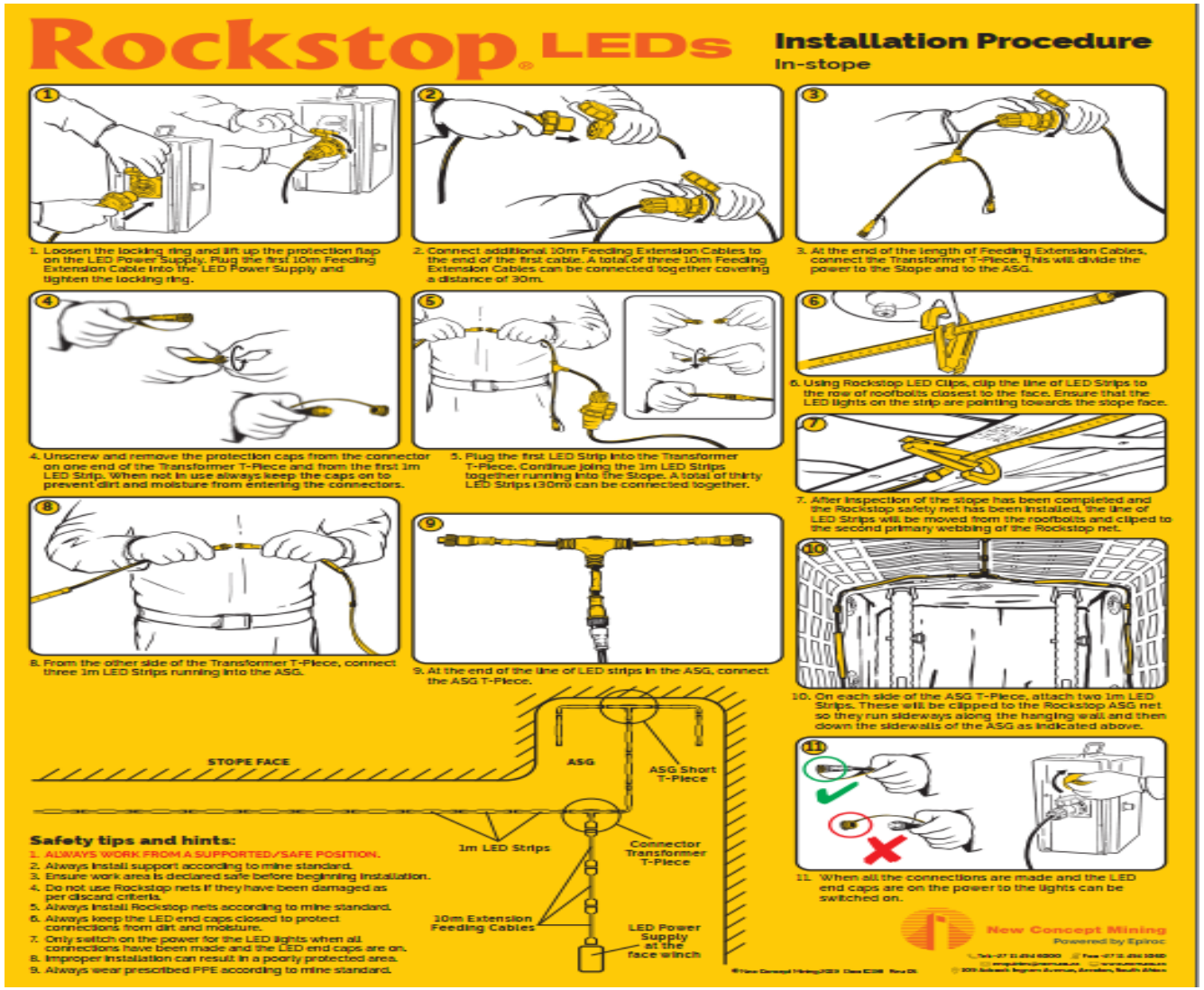
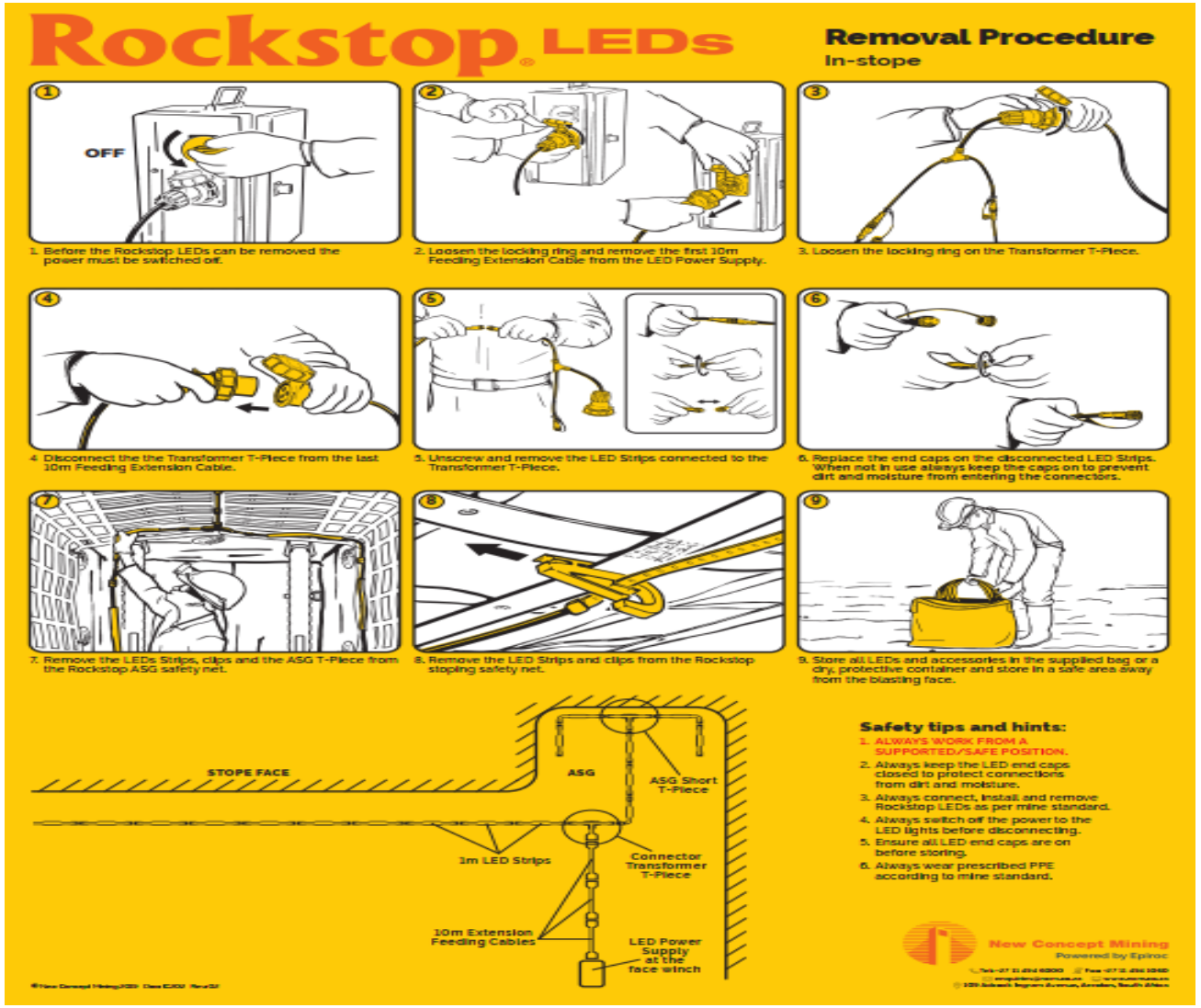
INSTALLATION PROCEDURE



REMOVAL PROCEDURE



NEW CONCEPT MINING LIGHTS

Normal Conditions

Under normal underground conditions, the environment is predominantly dark, with limited illumination provided by cap lamps.

NEW CONCEPT MINING LIGHTS

With In-Stope Light

In-stope light with the net for extra safety and support

8 SHAFT 16 LEVEL WORKPLACE 1ST LIGHTS INSTALLED 17-10-2024

Camera without flash or cap lamp

Camera with flash and cap lamp

Camera without flash or cap lamp only in-stope lights

EVANDER 8 SHAFT 16 LEVEL GULLY TOWARDS THE PILLAR

EVANDER 8 SHAFT 24 LEVEL 24N1D PANEL 9

NEW CONCEPT LED SPECIFICATIONS

SPECIFICATIONS	
Category	BETA
Description	AC36V constant current
LED Make	EPISTAR
LED Type	SMD 2835
LED configuration	96
Range fed from ONE side	20+ Meters
Range fed from BOTH sides	40+ Meters
Operating temperature	-40 - +45 degrees C
IP Rating strip	68
IP Rating connectors	68
Power Consumption per Meter	13 W
Colour Rendering Index CRI	> 80
Colour temperature	5500 Kelvin
Luminous Efficacy	83,7 L/W
Lumens P/M	1200-1300
Supply voltage VAC	36 VAC
Light maintenance	15% - 20% Drop in 2 years
Expected Lifespan	2 - 5 Years
Warranty Lighting	1 Years
Fire Retardant	Yes
Outer covering	Food grade silicone
Dimensions	5mm X 14mm
Connectors	Factory fitted
Tensile strength	+-50 - 60KG
Overvoltage protection	Yes
Overheat protection	No
Dust repellant	Yes

New Concept Mining
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MINE PROCEDURE - INSTALLATION OF LED LIGHTS IN A STOPE

LESSON PLAN

RISK ASSESSMENT

EVANDER
GOLD MINING (PTY) LTD

INSTALATION OF LED LIGHTS IN A STOPE FACE AND DEVELOPMENT END
PROCEDURE

DOCUMENT NO.	REVISION	EFFECTIVE DATE	PRINT DATE	PAGE
MN-PROC-343	0	August 16, 2024	October 26, 2024	1 of 8

EVANDER MINES

Rock stop LED's

REVIEW NUMBER: 1.0	DATE: 16/08/2024
DOCUMENT TYPE:	Assessment Guide
REFERENCE NUMBER:	EVA 723

EMPLOYEE NAME & SURNAME :

EMPLOYEE SIGNATURE :

EMPLOYEE NUMBER :

ASSESSOR NAME :

ASSESSOR SIGNATURE :

DATE : SHAFT :

MARK THE APPROPRIATE BLOCK

COMPETENT ☐ NOT YET COMPETENT ☐ RE-TRAIN ☐ REFRESH ☐

Ref. No	Doc. Name	Doc. Title	Implementation Date	Effective Date	Next Revision Date	Version	Page
MN-RA-345	Issue-based RA	LED Light installation	16 August 2024	16 August 2024	15 August 2026	20	1 of 11

RISK ASSESSMENT TITLE: Installation of LED lights in stope face

This Risk Assessment is prepared according to the requirements stipulated under the Mines Health and Safety Act (Act 29 of 1996), Section 11, "Employer to assess and respond to risk". The process followed will be:

(1) Identify Hazards to which employees may be exposed whilst at work
(2) Assess the Risks to which employees may be exposed whilst at work
(3) Record the significant Hazards and Risks
(4) Make the records available to employees

Mitigating controls will include:

(1) Eliminate the risk at source
(2) Control the risk at source
(3) Minimize the risk
(4) Provide Personal Protective Equipment
(5) Monitor the risk

(1) Eliminating the risk may include changing the process, introducing a new process altogether or fully automating the process.
(2) Controlling the risk may include the introduction of detection devices and interlocking devices.
(3) Minimizing the risk may include the installation of mechanical guards or by reducing the exposure.
(4) If the risk is still not at an acceptable level, Personal Protective Equipment may be introduced as a last resort.
(5) If the risk remains, monitor the activities of employees

KEY LEARNINGS

KEY LEARNINGS: RATIONALE AND SUPPORT REQUIREMENTS

Successful implementation of in-stope lighting requires a structured and well-supported approach, underpinned by the following key elements:

- Rationale and support.
- Senior Management should be involved.
- Support and complete buy in from all stake holders.
- Financial support for the initiative.
- There should be enough human resource support (enough artisans).
    - systems to have in place – availability of spares.
    - training /coaching.
    - storing of equipment.
    - roles and responsibilities.
- Lesson plans.
- Risk assessment.
- Training.
- Making it part of the “MOSH” (Mining industry occupational safety and health) entry examination.
- Training – in the training centre and on site training.
- Drafting a standard Operating procedure (SOP).
- Risk assessment for the installation and removing of the lights.
- Clear indication of the roles and responsibilities of each role player.
- Clear understanding on the installation.
- Handling of the lights.
- Discipline.

ROLES & COMMITMENTS

ROLES AND COMMITMENTS: IN-STOPE LIGHTING IMPLEMENTATION

The successful implementation of in-stope lighting is dependent on a clear understanding of its **purpose, value and expected outcomes** across all levels of the organisation.

- The importance of the rationale behind the illumination should be clearly understood and effectively communicated to relevant stakeholders – this is to improve workface visibility for better hazard identification, strengthen safety performance and increase work efficiency.

- Communication
  - Roles and responsibilities of the various stakeholders
  - The importance of in-stope lights - crews need to understand the purpose for the lights
  - Communication should be clear on the installation, removal and storage of the lights

- Responsibility – each role player needs to understand his/her responsibility

- Training – training material that form part of the training modules when employees returning from leave and attending on site training.

- Senior management – taking ownership of the in-stope lights – changes in management can significantly influence the commitment of role players

- Production supervisor / Mine overseer
  - Install lights in the correct locations
  - Implement measures to prevent misuse or damage of the lights
  - Ensure lights are in a good working condition, well maintained and that all necessary accessories are available
  - Ensure lights are stored correctly as per SOP

CONT: ROLES AND COMMITMENTS: IN-STOPE LIGHTING IMPLEMENTATION

- Foreman
  - Ensuring lights are installed according to standard, safely and at the designated locations
  - Ensuring that there is adequate spares available
  - Providing relevant training.

- Electrician
  - Connecting lights to the main supply and ensure that it is safe
  - Inspect and maintain the lights
  - Assist with first time installation with the crew and perform a PTO on the lights.

- Miner/team leader
  - Install, remove and store lights
  - Install lights in locations where they will not get damaged as part of the MOSH
  - Report faulty equipment
  - Remove lights prior to blasting.

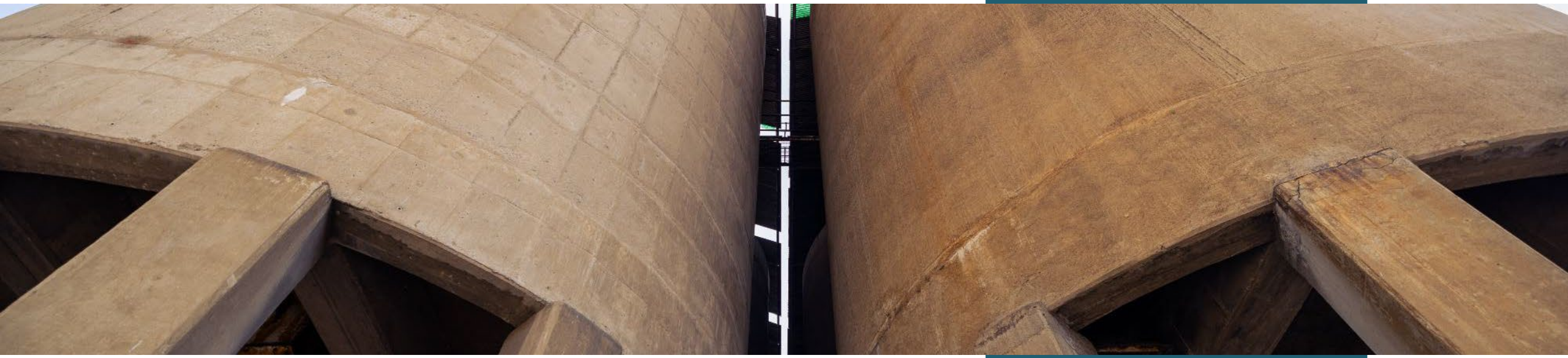
- Success depends on discipline and commitment. If the team is not disciplined and committed to using the lights correctly, the desired outcomes will not be achieved.

WAY FORWARD

WAY FORWARD

- Accelerate full rollout of in-stope lighting across all stoping panels especially at 24 Level
- Integrate lighting as a mandatory critical control for FOG prevention
- Incorporate into DMS (planned maintenance system)
- Continue behavioural interventions to eliminate shortcuts

CONCLUSION



CONCLUSION

The implementation of in-stope lighting is demonstrating measurable impact in reducing FOG-related incidents. Sustained improvement will depend on full rollout, consistent utilisation, and continued reinforcement of critical control management at operational level.

Any questions?

Team work makes the dream work.

Thank you

Zero Harm!
Every employee return home unharmed everyday.