



# LEADING PRACTICE SUCCESS STORY

(PERMANENT WORKFACE AREAL MESH)



## OVERVIEW

### FULL DESCRIPTION OF THE RISK ADDRESSED:

Underground mining environments, particularly in deep-level gold mines, present a high risk of rockfalls due to seismic events and high stress conditions. The Driefontein mine has experienced multiple seismic incidents, including an M2.3 seismic event at Driefontein, which resulted in five injuries. Investigations showed that while support was within standard compliance, additional improvements were necessary to further reduce rockfall-related injuries.

To mitigate these risks, the mine introduced a permanent workface areal mesh. The solution provides enhanced rockfall protection by ensuring continuous meshing over exposed surfaces, thereby preventing loose rock from falling and reducing the likelihood of injuries.



- A** **Mining Company:** Sibanye-Stillwater
- B** **Commodity:** Gold
- C** **Operation/Mine:** Driefontein
- D** **H&S Success Story:** Permanent blast on mesh/nets saving lives.
- E** **Number of Employees Affected by H&S Success Story:** 7 (from recent seismic events) plus overall workforce safety improvement.
- F** **Occupations involved:**
  - Miners
  - Rock Engineers
  - Mine Management
  - Safety Officers
  - Underground Supervisors
  - Mineworkers exposed to rockfall hazards

## INCIDENT DESCRIPTION:

**5**  
EMPLOYEES



On separate occasions at Driefontein Mine, two seismic events occurred, resulting in injuries to seven employees:

**IMPACT:**

Five employees injured

**SUPPORTING VISUALS:**

Section drawing showing the position of the employees, survey plan of the accident, locality plan (See figure 3)

**OBSERVATION:**

Support was found to be to standard in terms of distance to the face

**2**  
EMPLOYEES



**IMPACT:**

Two employees injured



## BENEFITS AND IMPROVEMENTS REPORTED BY AFFECTED STAKEHOLDERS:



**Reduction in Injuries:**

Significant improvement in worker safety, with mesh acting as an additional barrier against falling rock hazards.



**Increased Operational Efficiency:**

Reduced downtime due to fewer accident investigations and work stoppages.



**Improved Employee Confidence:**

Workers feel safer and more secure, leading to better morale and productivity.



**Enhanced Support Compliance:**

Ensures continuous support coverage, minimising unsupported area.

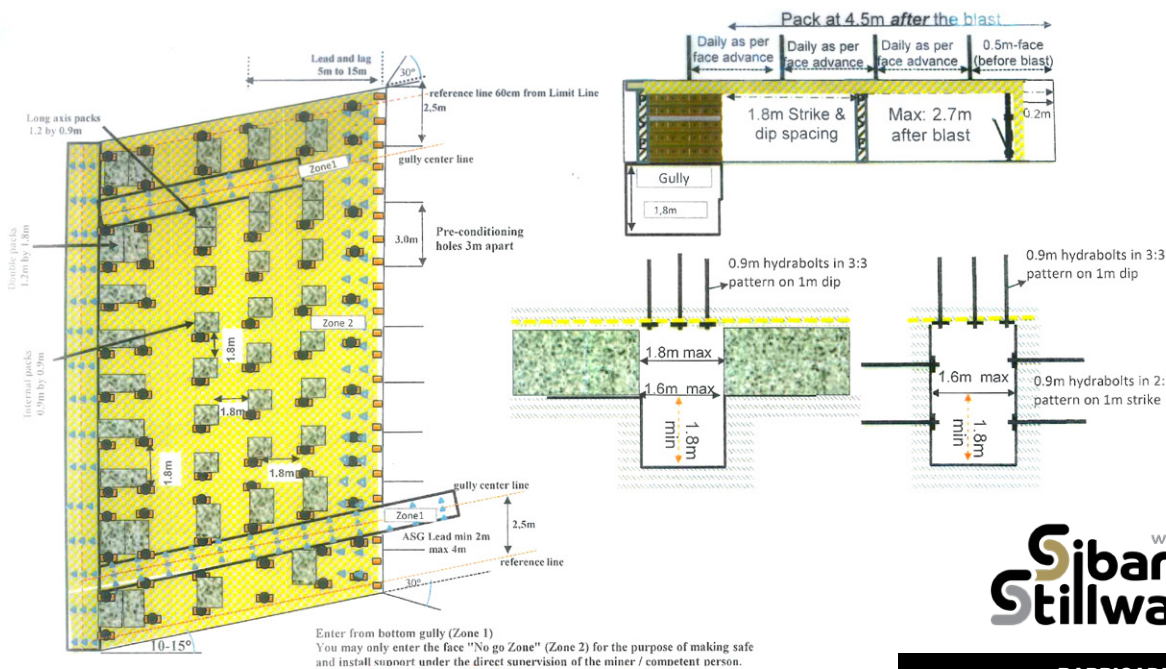


**Industry Leading Practice Adoption:**

Aligns with leading global mining safety standards and innovations in rockfall prevention.

**CONCLUSION:** The adoption of permanent areal mesh has proven to be an effective measure in reducing fall of ground injuries and improving mine safety at Driefontein mines. This success story highlights the critical role of innovative support systems in underground mining, demonstrating that enhanced design and proactive risk management significantly contribute to a safer working environment.

Plan view not to scale



**BARRICADES:**  
Blasting barricade: Max 8m from the face.  
Back area barricade: Max 15m from the face.

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## RECOMMENDED SUPPORT SPACINGS

### TEMPORARY SUPPORT:

- Yielding Temprite Props must be installed at a distance of not more than 0.2m from the face and not more than 1.5m apart on dip and strike.
- The permanent in-stope mesh must be installed when the installation of the temporary is taking place to secure it against the hanging wall.
- The permanent in-stope mesh support must be installed for areal coverage when examination of the face takes place.
- The permanent in-stope mesh must be installed 0.2m from the face before any drilling may takes place.
- Temporary support to be installed before.

### GENERAL STOPING WIDTH FOR ALL STANDARDS:

Breast panels:  
Min 1.2m - Max 2.5m.  
Isolated blocks of ground:  
Min 1.5m - Max 2.5m.  
Normal Up-dip:  
Min 1.2m - Max 2.2m.  
WRS:  
Min 1.8m - Max 2.2m.

### FACE LENGTH INCREASE:

- Additional Instope bolting to be installed for every 1.5m of face length increased.
- Additional Elongate to be installed for every 1.8m of face length increased.
- Additional pack to be installed for every 3m of face length increased.

### PACKS:

- Dip: 1.8m
- Strike: 1.8m
- Pack to face maximum of 4.5m after the blast.
- Stopping width up to 1.8m, 0.9m by 0.9m packs to be installed.
- Stopping width greater than 1.8m up to max stoping width of 2.4m, 1.2m by 1.2m pack to be installed.

### PSE ELONGATES:

- Dip: 1.8m
- Strike: 1.8m
- PSE to face maximum of 2.7m.
- PSE not to be over extended past the white mark indicator.
- Dislodged elongates to be replaced on the next shift.

### IN-STOPE TENDON SUPPORT:

- 0.9m In stope tendons to be used stoping widths less than 1.4m.
- 1.2m In-stope tendon to be used stoping widths more than 1.4m.
- Dip spacing 1.5m maximum.
- Strike spacing as per daily advance, maximum 1.5m.
- Tendons to be installed not further than 0.5m from the face before each blast.
- Angle of bolts not to be less than 70° to hanging wall strata.

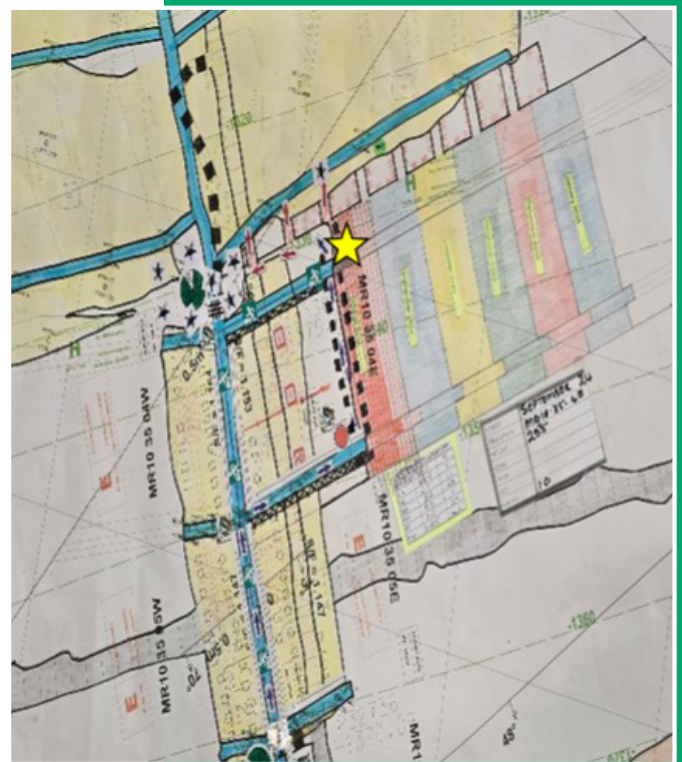
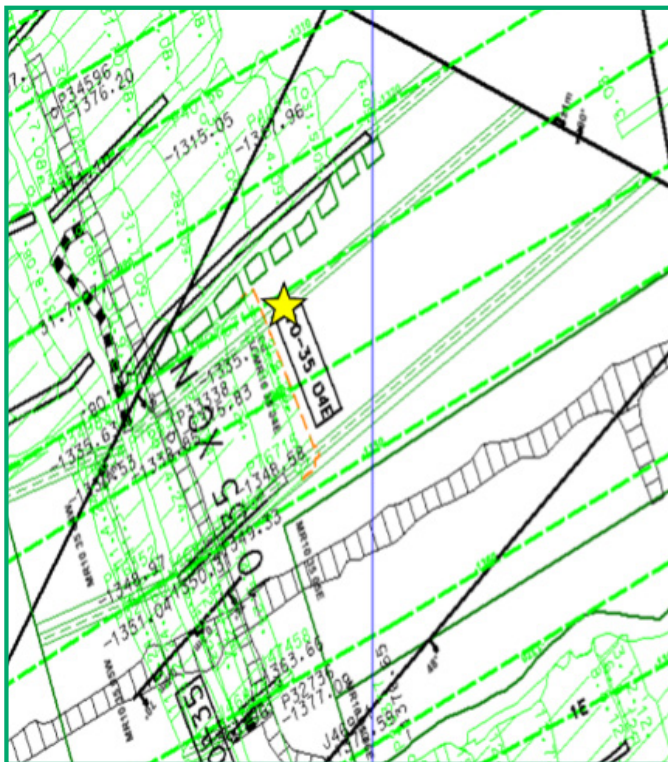
### PERMANENT BLAST IN-STOPE MESH:

- It is compulsory to install permanent blast on steel mesh+face netting in all panels and extended to cover the gully hanging wall well.
- To enter panel on the top, do entry examination (barring of the hanging wall and face) from a safe side.
- After declaring hanging wall and face safe - roll mesh down the length of the face with the side o mesh containing the cable close to the face.
- Whilst lifting up the mesh close to the face install temporary support unit 0.2m from face underneath the mesh securing the mesh against the hanging wall.
- Once full unit secured on face with temporary support units, pull and tension mesh back to back area and secure new mesh to old mesh with clips.
- After completion of hanging wall mesh unit - face netting to be installed between the temporary support unit and the face.
- Face Netting - Netting/Mesh to be secured to the temporary support unit headboard and new installed hanging wall mesh with the hooks supplied.  
Hanging wall mesh and face netting to be installed systematically down the panel starting from the top.
- Once full panel are secured systematically with hanging wall mesh and face netting, in-stope bolting can be installed - pinning the mesh to the hanging wall adjacent to the cable and through the loops.
- To increase coverage from the face netting - the face netting must be secured to the in-stope bolting hooks and to the bottom of tempory support units.
- The mesh must be installed to cover the entire hanging wall, no holes to be left open.

Figure 1: Permanent Areal Mesh Support Standard



**Figure 2:** Mesh pinned against the hanging wall with camlock jacks and bolts



**Figure 3:** Mine plan indicating the Driefontein mine M2.3 Seismic Event location where (5 Employees were Injured)



A



B



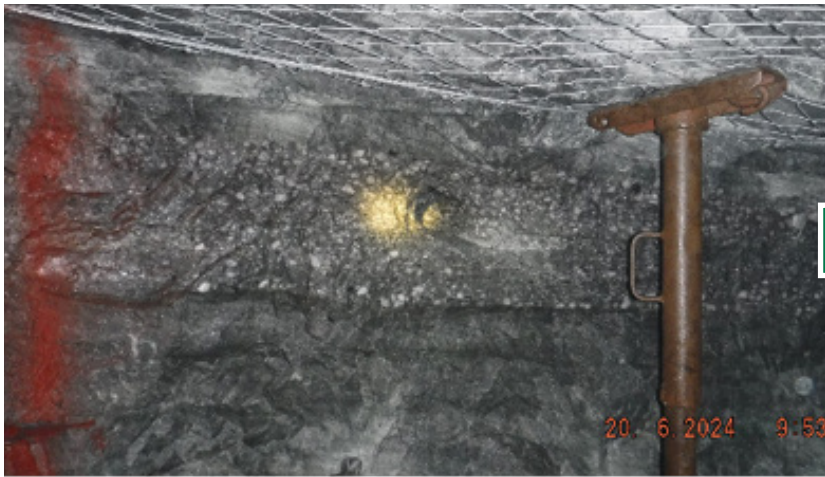
C



D

**rock  
contained  
by the  
permanent  
mesh**

**Figure 4:** Images indicating the rock contained by the permanent mesh during the incident.



A



B



C



D

## M2.3 Seismic Event

**Figure 5:** Driefontein mine M2.3 Seismic Event (5 Employees Injured)