

COMPANY PROFILE

Traffic management & vehicle interaction

Separating people from machines at surface mines, processing plants and tailings facilities.

MOSH leading practice

EMESRT layers of defence

MHSA Regulation 8.10

WHO WE ARE

Separating people from machines

Treo Group is an independent South African engineering and project consultancy working inside live mining operations and processing plants. Our engineers understand the operational pressure behind every traffic rule: production targets, shift changes, contractors on site and machines that cannot see a person on foot.

Trackless mobile machinery (TMM) remains one of the top fatal risks in surface mining. We help operations reduce that risk to **as low as reasonably practicable** by getting the basics right first (site layout, segregation and procedures) and then making sure that proximity detection and collision avoidance technology works as intended, rather than creating a false sense of security.

Our work is aligned with the **MOSH Traffic Management Leading Practice**, the **EMESRT** vehicle interaction layers of defence and **Chapter 8 of the Mine Health and Safety Act Regulations** (Regulation 8.10).

TRUSTED BY LEADING MINING & MINERALS-PROCESSING OPERATIONS



41 sites

reviewed and supported
across 6 operations

~R1bn

Level 9 collision
avoidance programme
managed, 2017 to 2024

600+

light vehicles fitted with
driver monitoring and
fatigue management

10 yrs

working inside live mining
operations

THE CHALLENGE

The risk we help you manage

Surface operations, concentrators and tailings facilities share a common problem: machines and people working in the same space, with roads, walkways and rules that have grown over time rather than by design. The five priority unwanted events (PUEs) we work to prevent are:

TMM to pedestrian

Collision between a machine and a person on foot.

TMM to TMM

Collision between two machines or vehicles.

TMM to infrastructure

Collision with buildings, structures, berms or services.

Loss of control

Runaway, rollover or loss of control of a machine.

TMM to void

Driving or tipping into a pit edge, excavation or bin.

THE FRAMEWORK WE WORK TO

■ **MHSA Regulation 8.10**

Requires operations to assess the significant risk of TMM collisions with pedestrians and with other TMM, and to put controls in place, including systems that detect, warn and, where required, intervene to bring a machine to a safe standstill.

■ **MOSH Traffic Management Leading Practice**

The industry leading practice for open pit and open cast operations: a structured traffic management system built on traffic flow analysis, risk assessment, control identification and control effectiveness.

■ **EMESRT Vehicle Interaction**

The nine layers of defence that run from site design and segregation, through operational discipline, to operator awareness, advisory and intervention technology.

Nine layers of defence

EMESRT's vehicle interaction model sets out nine layers of control. Technology at levels 7 to 9 only works when the layers beneath it are effective. Treo evaluates every layer, closes the gaps in levels 1 to 6 and makes sure levels 7 to 9 are applied where the risk is significant.

1	Site Requirements	Mine and plant layout, road design, intersections, parking and lighting.	Design controls Levels 1 to 3
2	Segregation Controls	Physical separation of pedestrians, light vehicles and heavy machinery.	
3	Operating Procedures	Traffic rules, road hierarchy and right of way, speed limits and signage.	
4	Authority to Operate	Training, licensing and permits for operators and vehicles.	Operational discipline Levels 4 to 6
5	Fitness to Operate	Operator fitness, fatigue management and pre-use machine checks.	
6	Operating Compliance	Supervision, monitoring and enforcement of the rules in the field.	
7	Operator Awareness	Proximity awareness: the system alerts the operator.	Technology controls Levels 7 to 9
8	Advisory Controls	Proximity detection: the system advises the operator to act.	
9	Intervention Controls	Collision avoidance: the system takes control to slow or stop the machine.	

Design

Traffic flow, road layout, segregation and road hierarchy reviews, with conceptual layouts and costed options.

Discipline

Procedures, authority and fitness to operate, and field compliance audits that test what really happens on the road.

Technology

Regulation 8.10 significant-risk assessment, CAS and PDS selection, installation, commissioning and adoption.

WHAT WE DO

Our traffic management services



Traffic Management Plans

Development, review and update of site traffic management plans that are site specific, drawn to scale and aligned with your group standards and the MOSH leading practice.



Pedestrian Segregation

Separation of people from machines: walkways, crossings, barriers, parking and lay-down areas, and safe access to workshops, plants and offices.



Road & Walkway Condition

Visual pavement, roadway and walkway condition assessments, berm and windrow checks, and lighting and visibility reviews.



Regulation 8.10 & CAS/PDS

Significant-risk TMM identification, EMESRT level 7 to 9 readiness, vendor selection, installation, commissioning and performance verification.



Training & Change

Operator and supervisor engagement, scenario-based training, alert management and adoption support so new rules and technology stick.



Road Hierarchy & Priority Rules

Road classification, right-of-way and priority rules, intersection control, speed limits and signage that operators can apply without interpretation.



Traffic Flow Analysis

Traffic counts, load and haul route analysis, and conflict point mapping to remove interactions and separate opposing traffic.



Traffic Risk Assessments

Baseline, issue-based and TMM risk assessments, unwanted event identification, critical controls and control effectiveness analysis.



Audits & Assurance

Independent traffic management reviews and compliance audits with risk-rated findings, photographic evidence and practical recommendations.



Driver & Fleet Safety

Driver monitoring and fatigue management, fleet management system route compliance and vehicle interaction data analysis.

SPOTLIGHT

Road hierarchy & priority rules

Most surface collisions happen where rules are unclear: at intersections, in parking and loading areas, and where light vehicles and people meet heavy machinery. A clear road hierarchy tells every road user who gives way, where they may travel and how fast.

We classify each road (haul roads, plant roads, service roads, light vehicle routes and pedestrian zones), set right-of-way and priority rules, and design intersections, signage and speed zones to match. The rules are written into the traffic management plan and procedures, and tested in the field.

A TYPICAL RIGHT-OF-WAY ORDER, TAILORED TO EACH SITE

1

Emergency vehicles

Responding with lights and sirens

2

Loaded haul trucks

Largest stopping distances and blind spots

3

Empty haul trucks

Heavy machines returning to the loading area

4

Ancillary & support equipment

Dozers, graders, water bowsers, service trucks

5

Light vehicles

Escorted or authorised access only

6

Pedestrians

Designated walkways and crossings only

- Road classification and route maps for each area
- Intersection control: stop, yield and priority rules
- Speed zones, overtaking and following-distance rules
- Light vehicle access, escort and positive communication rules
- Signage and road marking schedules

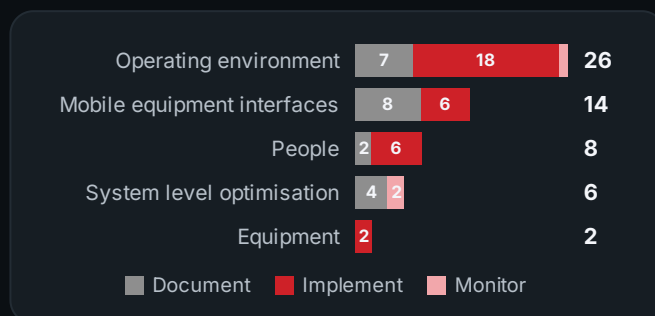
Review reports that drive action

Our traffic management and vehicle interaction control reviews give management a clear, evidence-based picture of where controls work and where they do not, with every finding traceable to a photograph, a risk rating and a recommendation.

WHAT EVERY REPORT CONTAINS

- 01 Documentation review**
Codes of practice, standards and procedures checked against all nine EMESRT levels.
- 02 Risk assessment review**
Issue-based and vehicle interaction risk assessments reviewed, with updated or new drafts where gaps exist.
- 03 Site findings by area**
Site walks and operator engagement, every finding numbered, risk rated and photographed.
- 04 Traffic flow analysis**
Vehicle and pedestrian movements, conflict points and road layout reviewed area by area.
- 05 Findings analysis**
Findings by control category, by document, implement or monitor gap, by risk rating and by area.
- 06 Recommendations**
Practical actions per operational area, with the high-risk findings prioritised for close-out.
- 07 Follow-up visit**
A return visit to verify close-out and record new observations.

EXAMPLE ANALYSIS: FINDINGS BY CATEGORY



Each finding is classed by control category and by whether the gap lies in the documented control, its implementation or its monitoring, so effort goes where it will make the most difference. Illustrative example.

TYPICAL REVIEW ENGAGEMENTS

Operation-wide review

MINES, CONCENTRATION AND SEPARATION PLANTS

3	9	5	3
review streams: documents, risk assessments, site	EMESRT control levels covered	control categories analysed	gap types: document, implement, monitor

Several mines and processing plants reviewed in one engagement. Every site finding is numbered, risk rated and photographed, documentation and risk assessment findings are reported separately, and high-risk findings are prioritised for close-out.

Plant review with follow-up

SMELTERS, REFINERIES AND CONCENTRATORS

2	3	3	2
site visits: review and follow-up	areas: risk assessment, TMP, site	ratings: acceptable, moderate, high	risk assessments updated or drafted

Treo updated the site's issue-based risk assessment, drafted a dedicated vehicle interaction risk assessment and returned to verify close-out, recording the improvements made and any new observations.

HOW WE WORK

No guesswork. A clear, guided path to a measurable result.

STEP 01

Scoping conversation

We get to grips with your operation, the traffic risks you are seeing and the outcome that would matter. No pitch, just clarity on the problem.

STEP 02

Audit & diagnosis

Our engineers review your plans, risk assessments and standards, and walk the roads to find the real gaps, not the symptoms.

STEP 03

Targeted solution

We design and deliver the fix: layouts, segregation, priority rules, procedures or a CAS and PDS deployment, built for your site and your people.

STEP 04

Measure & embed

We track implementation against the plan, verify controls in the field and hand over the capability. Wins are systemised, not lost.

OUR TRAFFIC MANAGEMENT METHOD

Our method follows the MOSH traffic management and collision management strategy: improve the design and discipline controls first, apply technology controls to the significant-risk machines, and bring it all together in one site traffic management plan.

01

Document review

Traffic management plans, baseline and issue-based risk assessments, codes of practice, group standards and incident history.

02

Traffic flow analysis

Site observations and traffic counts for load and haul and other vehicles, with conflict points mapped.

03

Field investigations

Visual roadway, pavement and walkway condition assessments, and engagement with operators, pedestrians and supervisors.

04

Risk & control analysis

Unwanted events identified, all potential controls listed across the nine layers, and control effectiveness tested.

05

Options & workshops

Alternatives formulated and workshopped with the client, with conceptual layouts, designs and costing.

06

Documentation & support

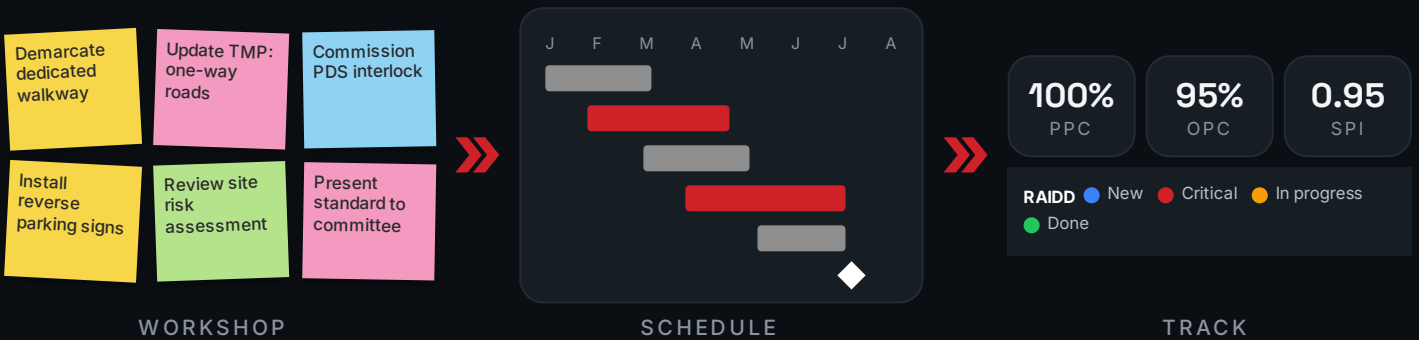
Revised traffic management plans, procedures, risk assessments and drawings, with implementation support and follow-up audits.

TYPICAL DELIVERABLES

- Site-specific traffic management plan and drawings
- Road hierarchy, priority rules and signage schedule
- Baseline and issue-based traffic risk assessments
- Significant-risk TMM register (Regulation 8.10)
- Risk-rated findings register with photographs
- Conceptual layouts, options and cost estimates
- Revised procedures and standards
- Progress reports, programme and monthly cost forecasts

Plan, schedule & track

Traffic management improvements touch many sites, owners and contractors at once. Treo plans and runs them as a programme, so every walkway, sign, standard and system is owned, scheduled and closed out.



Sticky note workshops

- Facilitated planning workshops with every task owner at project start
- Each owner writes their own activities, durations and links on sticky notes
- Overcomes the 'merge bias' of schedules built by one planner
- Owners commit to dates they set themselves

Schedule development

- Sticky notes captured into one integrated schedule
- Every activity keeps its sticky note ID and owner for traceability
- Baselined, with critical path and total views per site and area
- Schedule integrity checks and schedule risk analysis on request

Project tracking

- Fortnightly progress updates with dated notes on every activity
- Planned versus actual percent complete (PPC and OPC) and SPI per site
- RAIDD reports: risks, actions, issues, delays and decisions
- Documents progress matrix and area summaries on an online portal

26
SITES

Case example: multi-site PGM traffic management programme. More than 600 activities from site sticky note workshops, scheduled and tracked across 26 concentrators, plants and tailings facilities in three operating regions. Fortnightly updates, SPI per site, a documents progress matrix and RAIDD reports kept every site, owner and document visible through to close-out.

Selected projects



Level 9 Collision Avoidance System

VALTERRA PLATINUM, MOGALAKWENA • 2017 TO 2024 • ~R1BN

Vendor selection, installation, commissioning and adoption of an EMESRT Level 9 collision avoidance system across a large heavy mining fleet, delivered in five phases with full operational readiness and DMRE alignment.

- Field validation in live conditions
- Scenario-based operator training and alert management
- Ongoing governance of performance and adoption

Traffic Management Reviews

SIBANYE-STILLWATER, TRONOX • 2022 TO PRESENT

Independent reviews of traffic management plans and risk assessments, with site observations and operator engagement, aligned with EMESRT and ICMM standards and group traffic management standards.

- Risk-rated deviation registers per site
- Site-specific risk assessments drafted
- Updated TMPs: parking, walkways, signage

PDS & VDS Access Interlocks

PGM CONCENTRATOR COMPLEX & TSFS • 2024 TO 2025

Entrance controls at a platinum concentrator complex and its tailings facilities, so no person or vehicle enters an operational area without a working detection device.

- PDS tag testing stations interlocked with personnel turnstiles
- VDS testing stations interlocked with boom gates at plant and TSF entrances
- Requirement specifications (BRS and TRS) for PDS and VDS equipment
- Detection database linked to time and attendance; weekly station tests

Advanced Driver Assistance

MINING LIGHT VEHICLE FLEET • 2021 TO 2023 • R20M

Driver monitoring and fatigue management deployed across a light vehicle fleet of more than 600 vehicles, addressing fitness to operate (EMESRT level 5).

- 600+ light vehicles
- Fatigue and distraction alerts
- Fleet-wide roll-out and adoption

41 SITES ACROSS 6 OPERATIONS

26

Sibanye-Stillwater
PGM operations

5

Sibanye-Stillwater
Gold operations

3

Sibanye-Stillwater
Smelters & refineries

3

Tronox
Namaqua Sands

3

Valterra Platinum
Mogalakwena

1

Gold Fields
Mine site

Built for operations that take safety seriously

- **Operational experience**

Our engineers have worked inside live mines and plants, and understand production pressure and how rules are applied in practice.

- **Standards aligned**

Work aligned with Regulation 8.10, the MOSH leading practice, EMESRT and your own group standards, with ISO 45001 internal auditors on the team.

- **Technology that works**

Hands-on experience of CAS, PDS and driver monitoring, from vendor selection to adoption, so technology adds to the basics rather than replacing them.

- **Practical outputs**

Risk-rated findings, costed options and plans that your teams can implement, with support through to close-out.

Contact Us

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