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MCOP Guidelines for Managing Ground Vibration, Noise, Air-Blast, and Flyrock

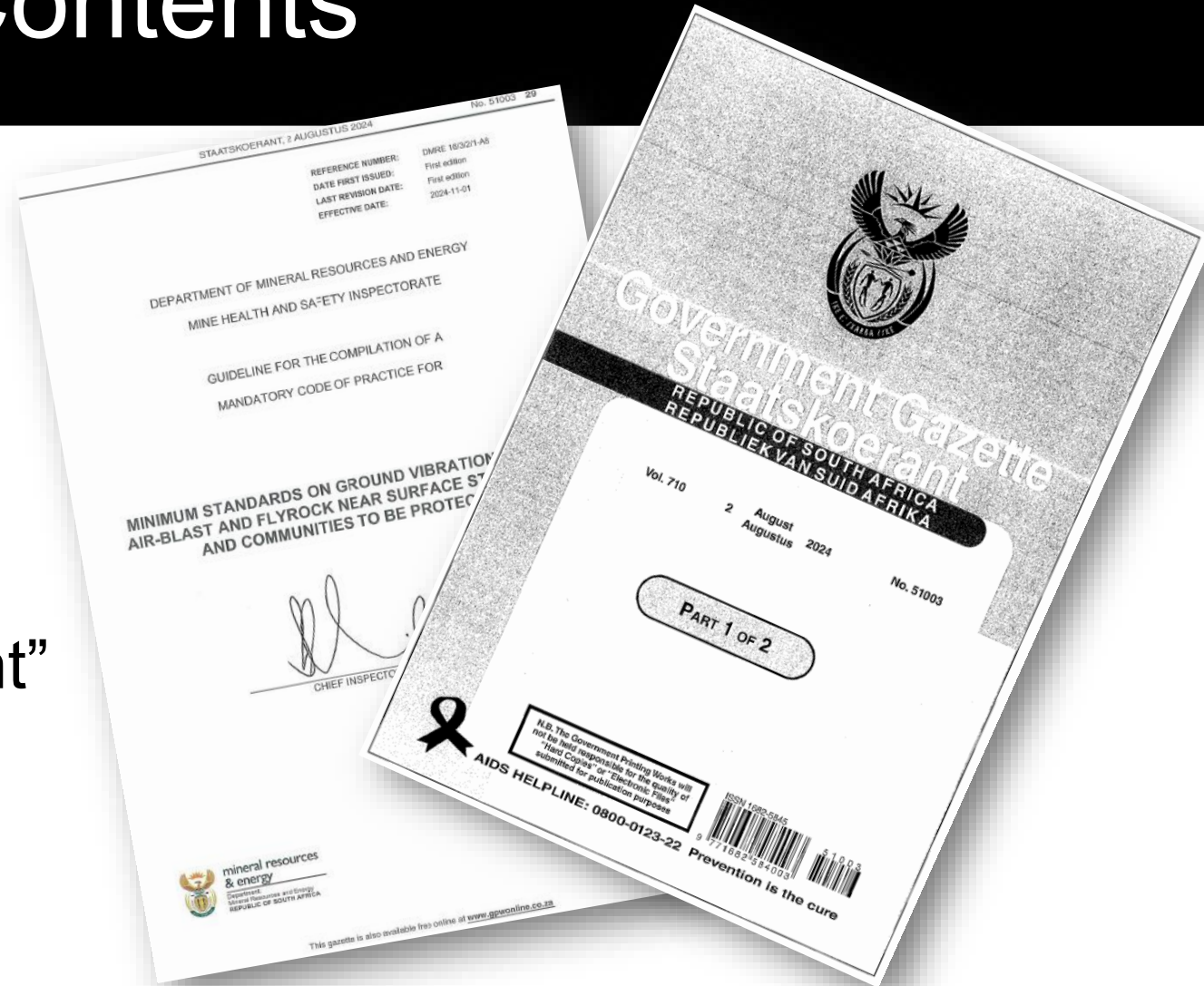
Eastern Cape Regional Tripartite Forum Meeting: 24 February 2026

Presenter: Corrie Rautenbach (Task Team member)

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Overview

MHSA Explosives Regulations, 2018; Reg. 4.7 provided legal requirement to limit Ground Vibrations Air-Blast and Flyrock in general and Reg 4.16(2) requires Permission from the PI, if blasting operations is to be conducted within 500m from public structures and communities.

Subsequent to extensive research conducted by the Council for Scientific and Industrial Research (CSiR) the instruction was issued to MRAC to develop an Industry Guideline to provide “Step-by-Step” guidance how to manage the risk associated with Ground Vibration, Air Blast and Fly Rock during Blasting in Surface Operations.



Overview

The Guideline is grounded in scientific evidence and real-world data, however, it is not a Blast Design Manual.

The Guideline Describes the Process to effectively Manage Blast related Risk and Set Recommended Limits for Ground Vibration, Air Blast and Fly Rock.

The multi disciplinary Blast Design Team must apply the latest Blasting Engineering Principles, Standards and Technology to develop the Blast Design; Determine specific Restrictions and Conditions to Ensure the Blast Impact is kept Below the Recommended Limits.



Overview

Gaps in Communication, Unclear Explanations, and differing Perceptions have led to Misunderstanding or Misinterpreting parts of the Guideline.

Any Right always come with Responsibility.

The right to mine comes with the responsibility to operate safely, sustainably, and without causing harm to people, property, or the environment.

That is why regulations exist—to set clear boundaries on what is reasonable practicality acceptable and what is not.

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Important Concepts

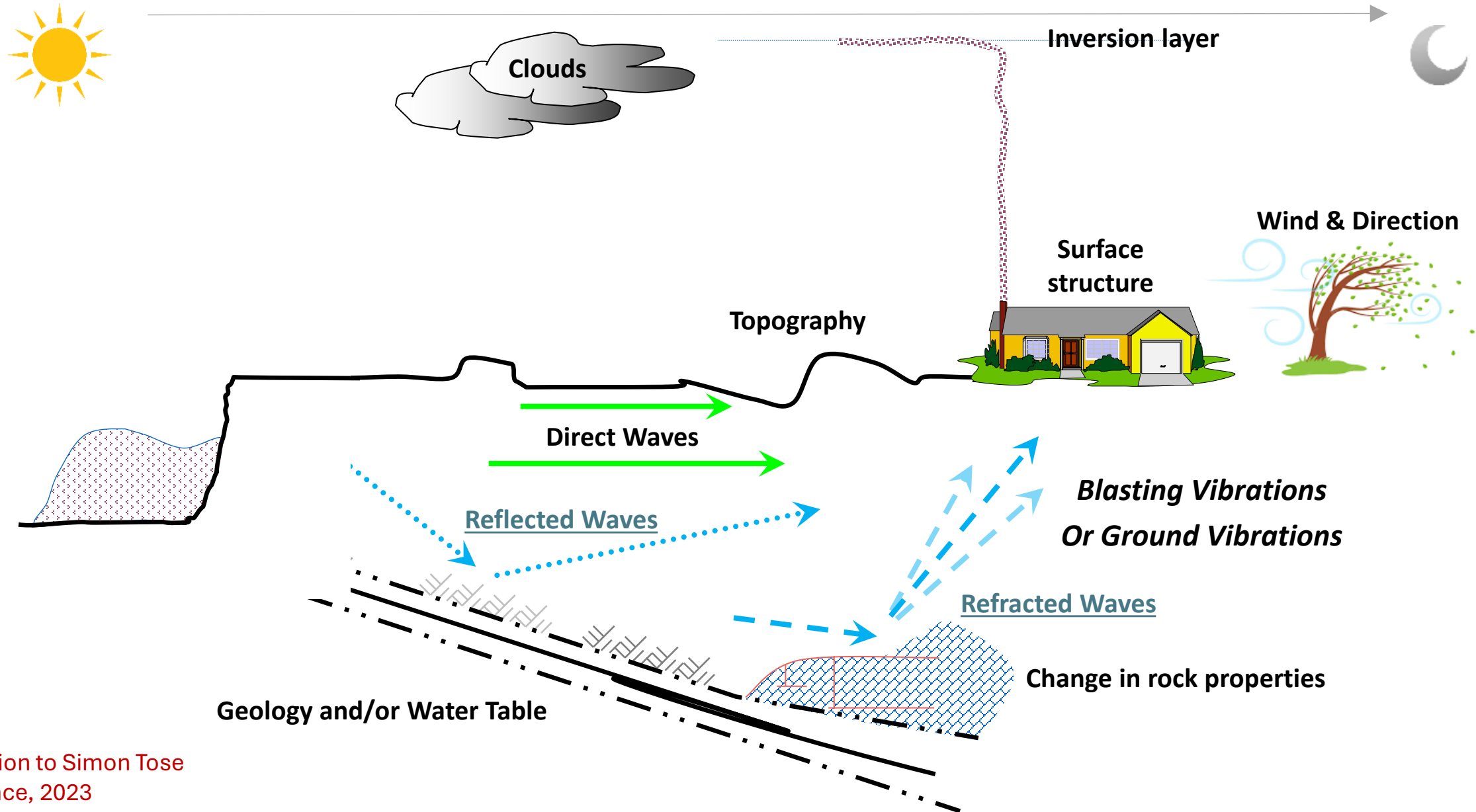
- **Ground Vibration** is like a small earthquakes caused by blasting; how much the ground shakes.
- **Air-blast** means a sudden “pressure wave” that travels through the air at the speed of sound caused by an explosion. (We feel Air-Blast)
- **Noise** means merely the audible part of the air-blast (> 20 Hertz). (We hear noise)
- **Flyrock** means “Pieces of rock thrown by the blast.”

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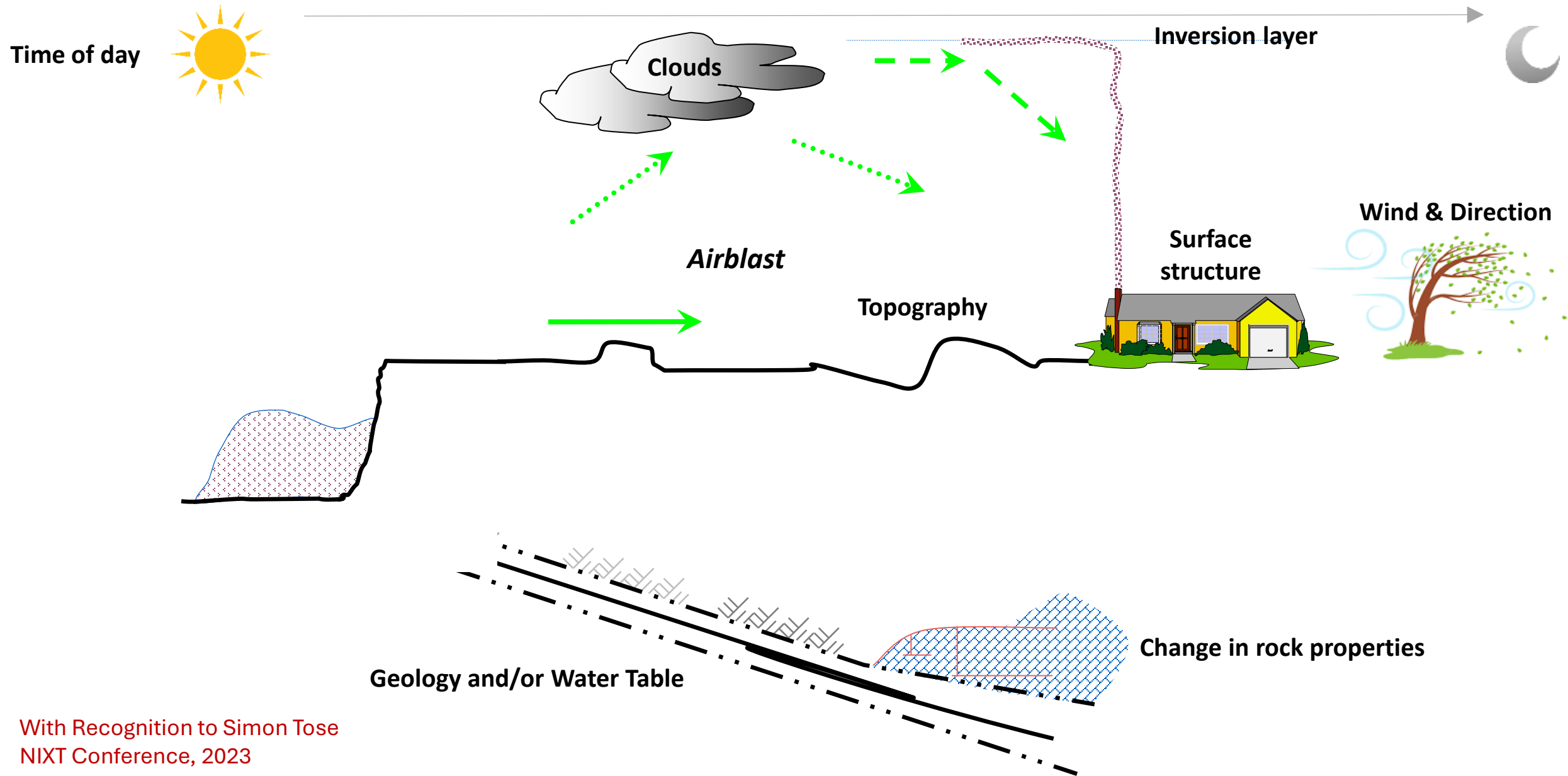
Important Concepts

- **Structure** means any public building public thoroughfare, railway line, power line, any place where people congregate or any other structure, which may be necessary to protect to prevent any significant risk.
- **Qualified blasting expert** means a person with the relevant blasting engineering, in-depth knowledge and extensive relevant experience, who:
 - Designs, organises, and supervises controlled blasts.
 - Apply a scientific evaluation of the site and the desired outcome.
 - Use explosives and initiating systems to achieve various outcomes in the field of mining, demolition or construction, in particular to limit ground vibrations, noise, air-blast and/or flyrock.

Concepts Simplified: Ground Vibration



Concepts Simplified: Air-Blast



Concepts Simplified: Air-Blast

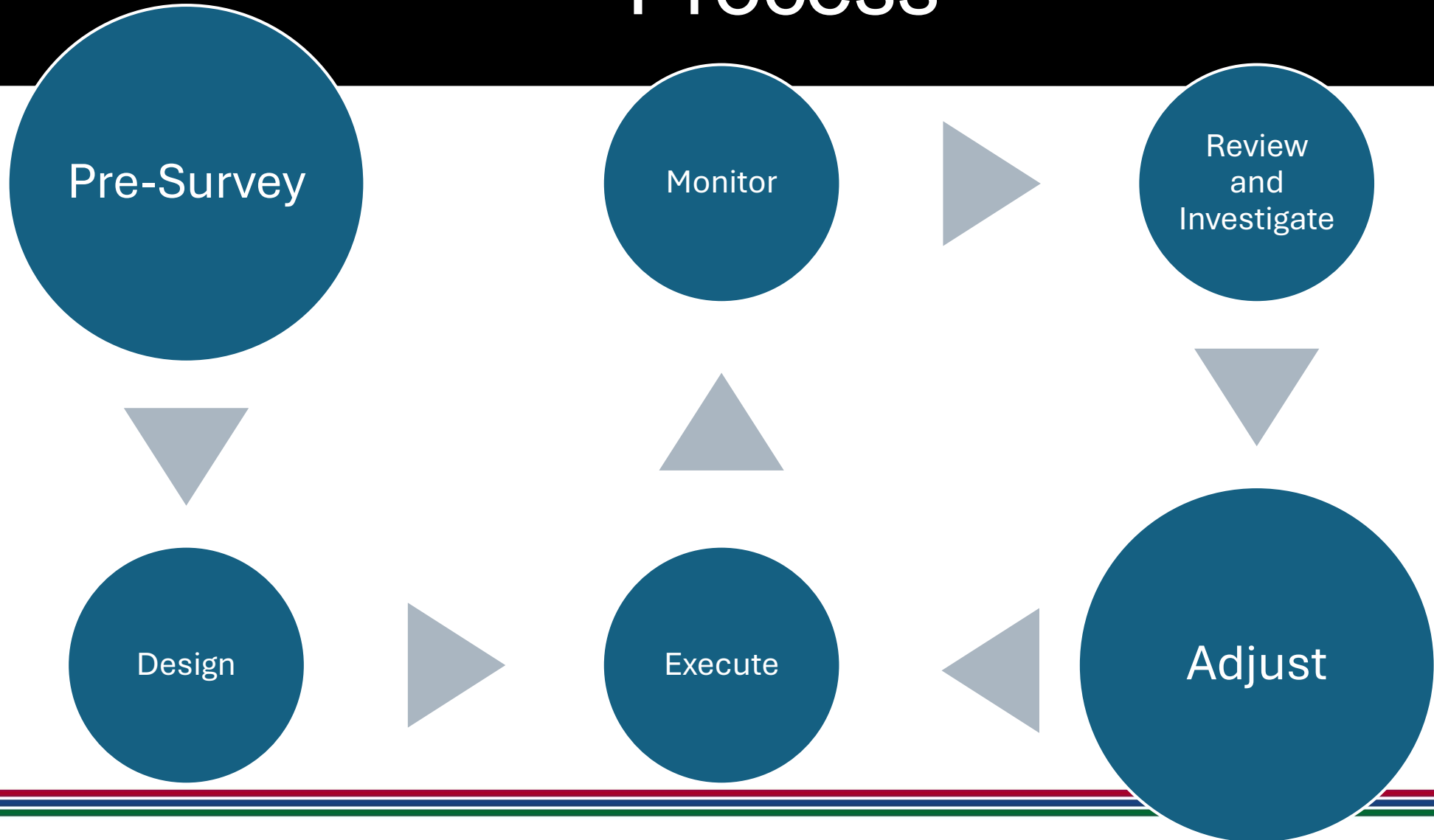


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Process



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Process

Pre-Survey

Monitor

Review
and
Investigate

Design

- Purpose to inform the Blasting Team
- Identify Type of Structure/s
 - Determine the Condition of Structure/s.
 - Measure Distance from Blasting Operation to the closest structure (Each Type)
 - Set Baseline Limits.

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Process

Pre-Survey

Monitor

Review
and
Investigate

Design

Execute

Adjust

- Apply Blasting Engineering Principles to Blast Design;
- Determine Site Specific Restrictions & Conditions
- Ensure the Blast Impact < Recommended Limits
- Calculate Predicted Levels

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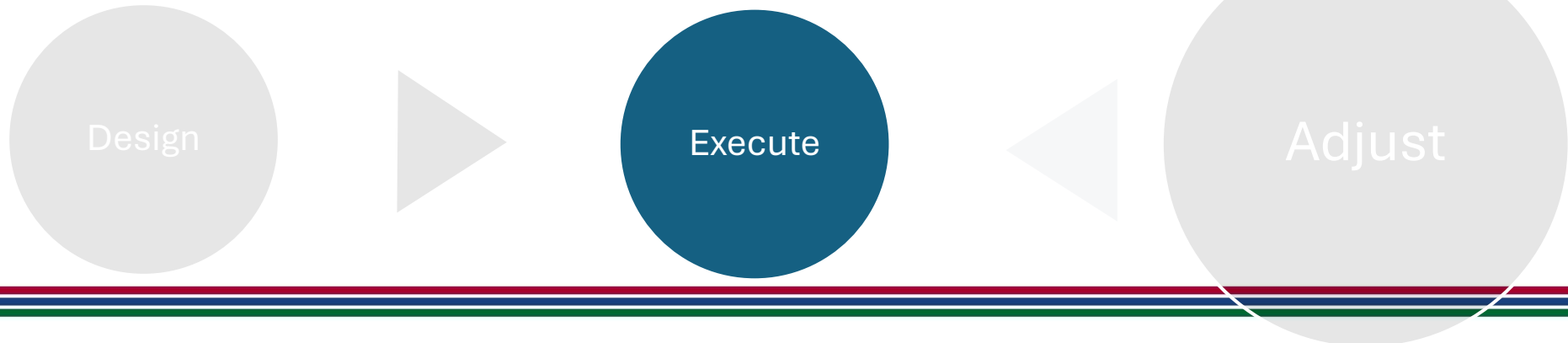


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Process

Implement Operational Controls (QA & QC) to Ensure the Blast is Executed as Designed.

- Follow the Approved Design & Timing
- Verify, Burden, Spacing, Hole Depth, Charge Mass, Stemming Length
- Any Deviation Must be Documented, Reviewed & Signed-Off by Blasting Team



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Process

Pre-Survey

Monitor

Review
and
Investigate

Measure Each Blast at Closest Structure for each Type
Independent Professional

- Competency
- Set-up of Equipment
- Calibrated Equipment

Design

Execute

Adjust

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Process

Pre-Survey

Monitor

Review
and
Investigate

- Compare Every Blast results with Predicted Values
- Investigate and clarify any significant differences to understand why
- Report and Investigate if values exceed recommended levels

Design

Execute

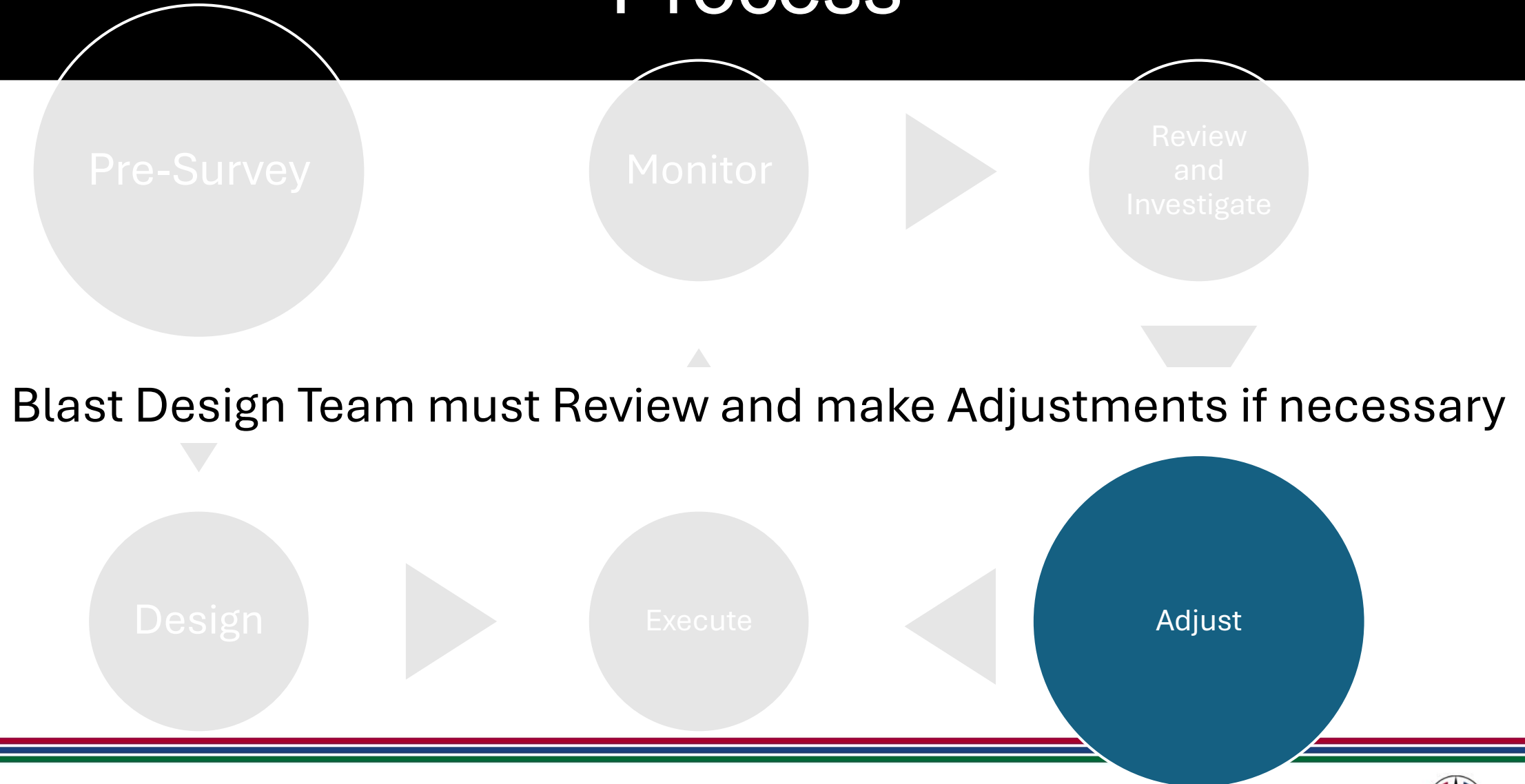
Adjust

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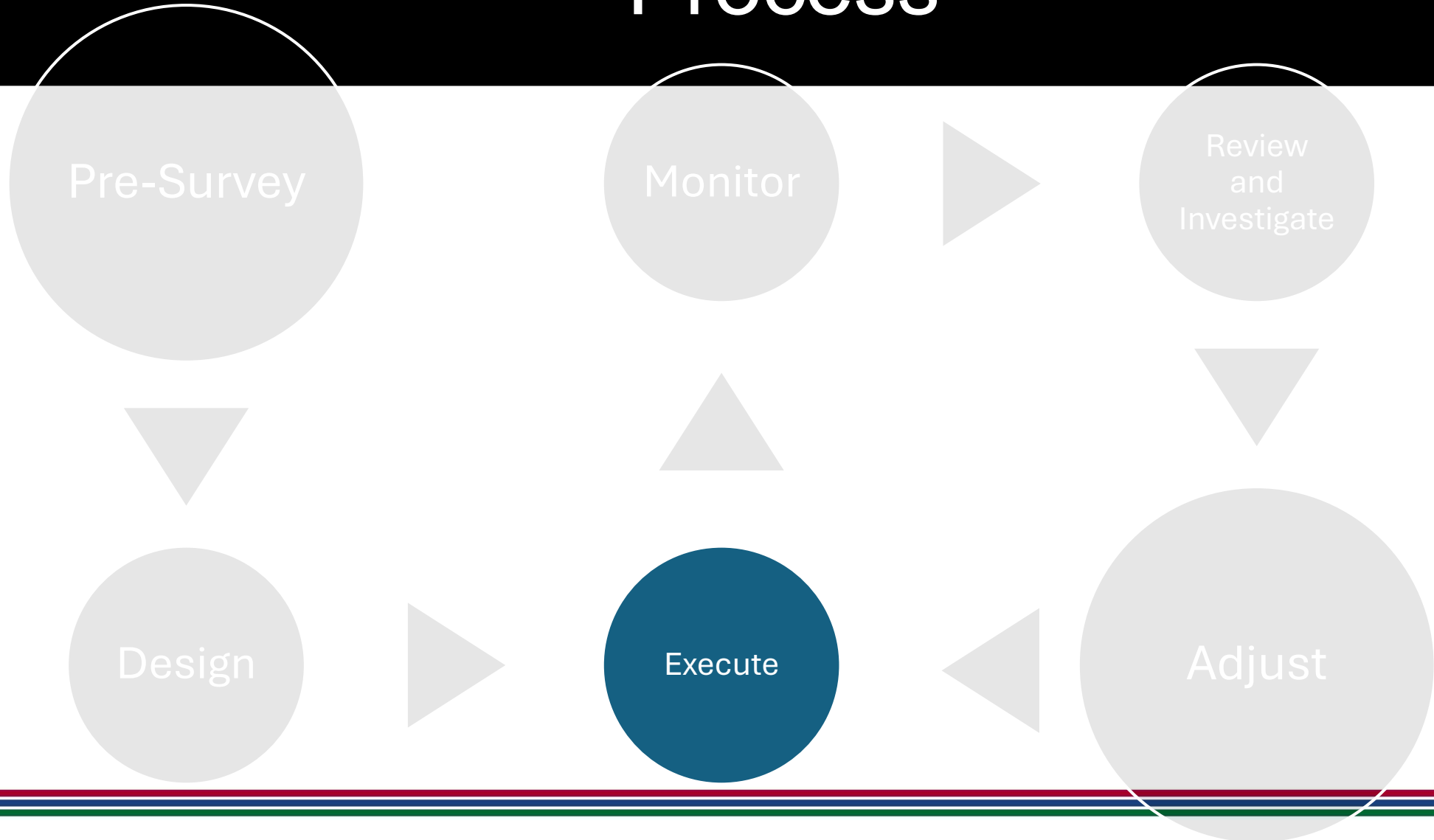
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Process



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Process



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Process

Formal Process to:

- Engage with all Effected Parties
- Address Concerns & Manage Complaints
- Record all Engagements, Concerns Raised & Complaints Reported.

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Recommended Limits: Ground Vibration

* At the structure of concern:

Structure Description	Ground Vibration Limit (mm/s)
National Roads/Tar Roads	150
Electrical Lines (Pylons)	75
Railway	150
Transformers	25
Water Wells	50
Telecoms Tower	50
General Houses of proper construction	USBM Criteria or 25 mm/s
Houses of lesser proper construction	12.5
Rural building – Mud houses	6

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Recommended Limits: Air-Blast

* At the structure of concern:

Decibels	Effect
100	Barely noticeable
110	Readily acceptable
120	Currently accepted by South African authorities as being an reasonable level for public concern (Not more than 10 % of measurement should exceed this value)
134	Currently accepted by South African authorities that damage will not occur below this level (No measurement should exceed this value outside of the mine boundaries)
164	Window break
176	Plaster cracks
180	Structural damage

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Recommended Limits: Flyrock

- No recommended distance for Flyrock suggested, other than to avoid it altogether outside the mine site or exclusion radius determined during the operational risk assessment.
- If the assessment of the danger zone suggests it may extend beyond the site boundary, then a controlled space or exclusion radius must be created where the public are either excluded or evacuated, and therefore not endangered by the blast.

“Who came 1st” & “Encroachment”

This Blasting Operation commenced in 1956:



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Why it matters

- Mining is not only a Key Contributor to South Africa's Economy but also Contribute to the General Standard of Living.
- It is Critical to rely on Science and Measured Data, Rather than Perceptions, Feelings and Emotions.
- Understanding Blast Effects ensures Informed Decisions and Sustainable Practices.
- Fact-based decision-making ensures a Safer, more Sustainable Future for All.
- Actual Measurements < Recommended levels = No Significant Risk to Health & Safety (Structures / People)

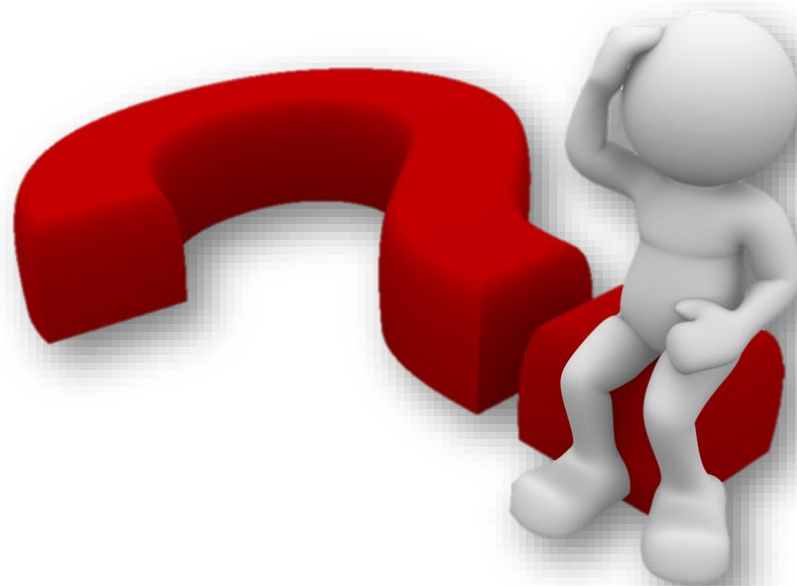
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Q & A

Thank You



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