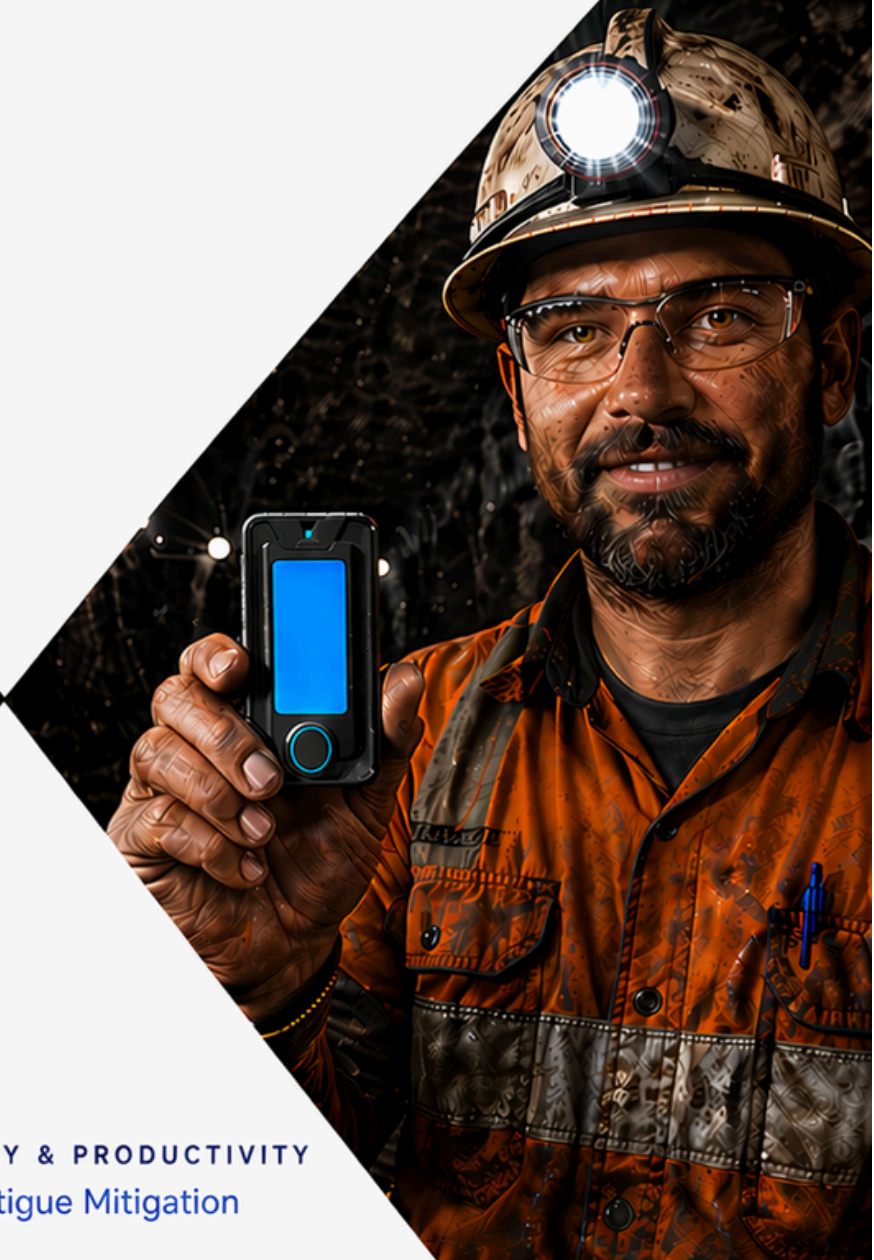




Mining ROI

Improve Safety and Productivity with Bluewake Fatigue Mitigation



IMPROVE SAFETY & PRODUCTIVITY
Bluewake Fatigue Mitigation

Introduction

This ROI provides a conservative, operations-focused framework to evaluate the financial impact of deploying Bluewake as a proactive fatigue mitigation control within industrial and mining environments. It is intended to support safety, operational, and financial evaluation using real-world operating conditions and typical mining cost structures.

Fatigue-related impairment contributes to:

- Vehicle and mobile equipment incidents
- Equipment damage and repair costs
- Near-misses and investigation costs
- Unplanned downtime and production loss
- Reduced vigilance, slower reaction times, and inconsistent cycle performance
- Workforce variability and fatigue-related absenteeism
- Increased reliance on stimulants

Bluewake enables a layered fatigue management approach by combining proactive mitigation with existing detection technologies. It can deliver ROI in under six months depending on deployment scale and site-specific risk. The cloud-based software layer supports data collection, analytics, and integration with existing operational and safety systems.

Bluewake

Bluewake is a proactive fatigue risk mitigation control designed to reduce operational risk, stabilize human performance variability, and strengthen layered fatigue risk management architectures across mining operations.

This document provides a financial justification framework aligned with how mining companies evaluate safety and risk investments.

Key Deployment Characteristics

- Simple installation and operator onboarding
- No consumables or ongoing operational burden
- Minimal IT or infrastructure requirements
- CAPEX or OPEX fleet deployment models available

Bluewake is designed to support alertness during low-performance windows, when fatigue-related risk is highest.

Catastrophic Risk Exposure

Fatigue-related major events represent low-frequency but extremely high-consequence risks. In mining haul truck environments, a single major fatigue-related event can exceed \$5M+ total impact, including:

- Equipment damage
- Production interruption
- Investigation and regulatory exposure
- Downstream operational disruption

In high-value asset scenarios, total exposure may exceed \$10M+ when extended production loss and cascading impacts are considered.










Personnel transportation represents an additional concentrated risk, where a single fatigue-related event can result in:

- Mass casualty outcomes
- Significant production loss
- Major regulatory, legal, and reputational consequences

Detection vs Mitigation

Traditional fatigue detection systems identify fatigue after behavioral degradation occurs. Once a microsleep is detected, it may already be too late. Bluewake provides proactive mitigation support before performance degradation becomes operationally visible.

Bluewake is designed to complement, not replace, existing fatigue detection technologies such as camera-based systems.

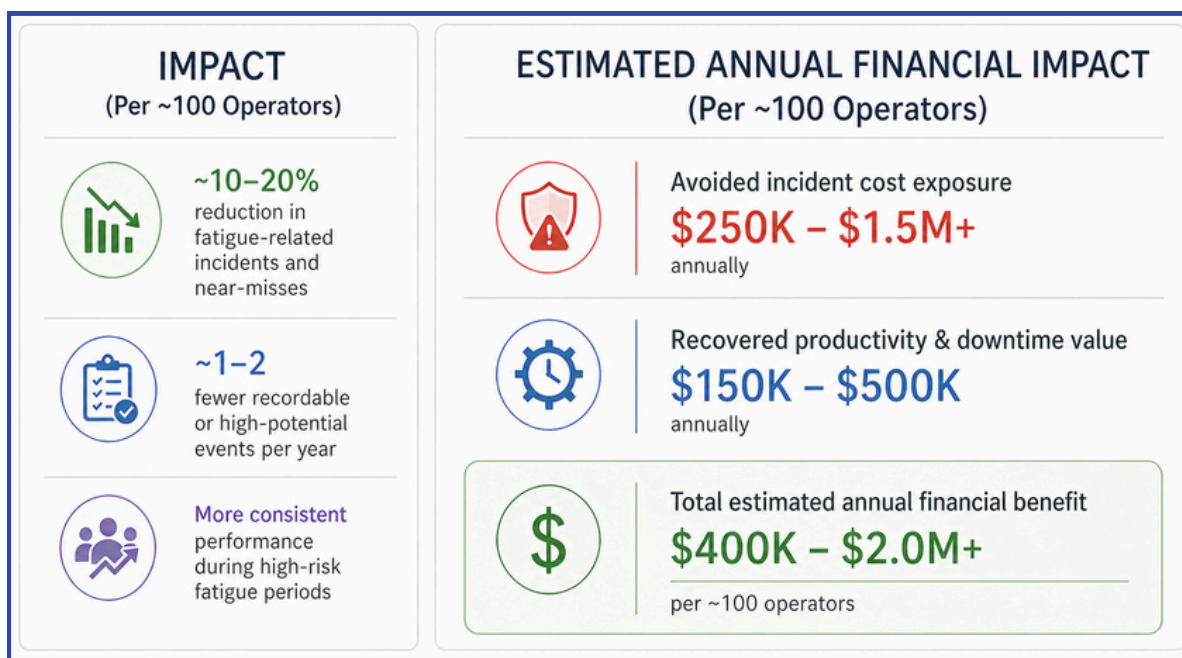
BLUEWAKE VS DFMS (PREVENTION VS DETECTION)		
Category	 Bluewake (Fatigue Mitigation)	 DFMS (Camera and Sensor-Based Detection)
 Role	Prevents fatigue	Detects fatigue
 Timing	Before and during fatigue build-up	After fatigue appears (late-stage)
 Mechanism	Stimulates alertness (blue light, 70Hz)	Alerts (audio/visual/physical) based on behavior
 Activation Method (Change Trigger)	Continuous (no trigger required) Always active	Triggered by visible signs (eye closure, head movement)
 Effectiveness Point	Keeps operator from becoming impaired	Responds when operator is already impaired
 Privacy	No visual data collected	Captures and processes behavioral data
 User Experience	Passive, non-intrusive, no monitoring	Active monitoring, can feel intrusive

Bluewake Financial Model

The Bluewake ROI model uses a conservative methodology, combining:

- Reduction in fatigue-related incident exposure
- Improved operational performance stability

Financial value is calculated by applying a conservative fatigue risk reduction factor to baseline incident cost exposure, combined with recovered productivity and downtime value.



Note: These figures are illustrative and should be refined using site-specific operational and financial data.

Bluewake Cost Model

- Device cost: Per-unit or fleet pricing (CAPEX or OPEX)
- Deployment: Minimal installation and training
- Ongoing costs: Negligible (no consumables, low maintenance)

Fleet & Asset Risk

In fleet-based environments, value can also be assessed at the asset level.

- Estimated value: ~\$4K – \$20K per asset annually

Higher value is typically seen in assets that:

- Operate extended hours or night shifts
- Sit on the critical production path
- Have high downtime or replacement cost

Sites with higher fatigue exposure (long shifts, remote operations, seasonal light variation) typically realize greater value.



Stay Alert. Stay Awake.

Payback Profile

Typical payback: < 6 months (site-dependent)

- Primary value driver: reduction of high-cost fatigue-related incidents
- Secondary value: improved operational consistency and reduced downtime
- ROI driven primarily by risk reduction, not productivity gains

Human Performance & Safety Culture Impact

Bluewake supports a shift from reactive detection toward proactive human performance optimization.

- Reinforces fatigue awareness
- Supports proactive safety culture initiatives
- Reduces performance variability during high-risk periods

Insurance, Risk Engineering & ESG Alignment

- Demonstrates proactive fatigue risk control
- Supports insurer and risk engineering engagement
- Aligns with ESG workforce health and duty-of-care objectives
- Strengthens enterprise risk posture over time

Deployment Scale Economics

- Fleet-wide deployment drives systemic risk reduction
- Improves adoption and normalized usage
- Reduces reliance on detection-only systems
- Enhances enterprise-wide performance stability

ROI Sensitivity Variables

ROI will vary based on site conditions. Key drivers include:

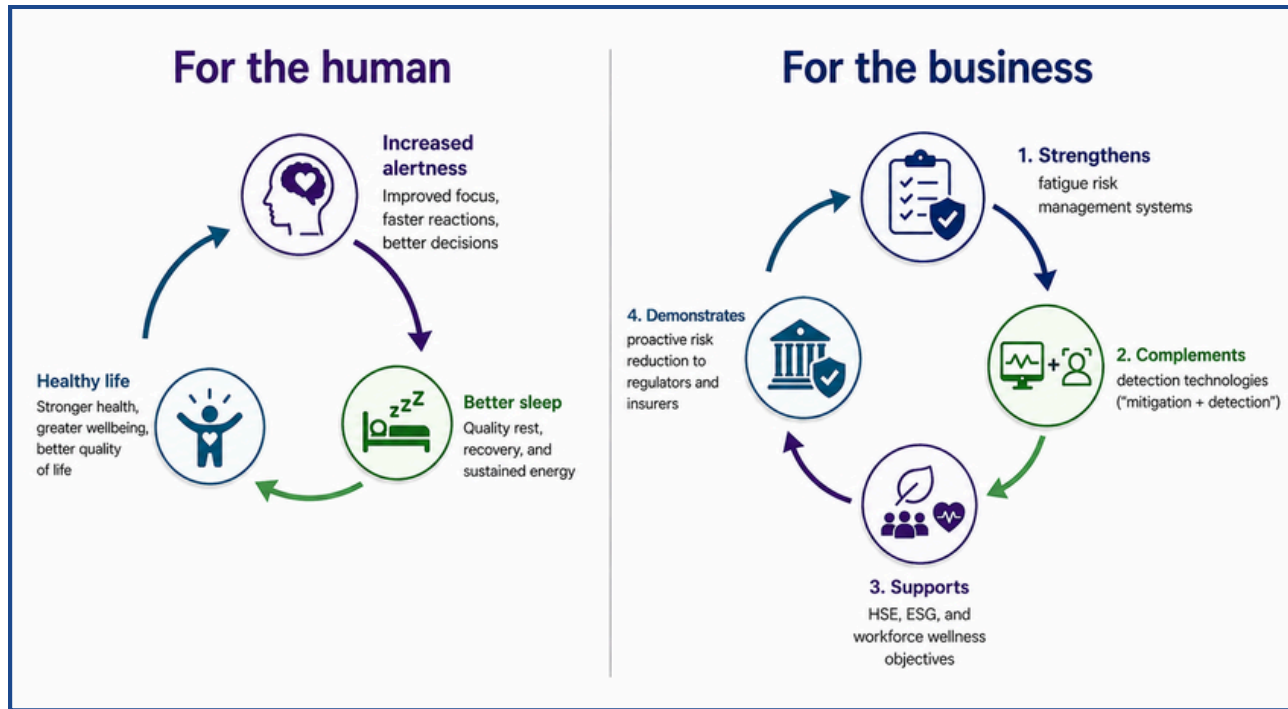
- Frequency of fatigue-related incidents
- Criticality of affected equipment
- Shift schedules and night work exposure
- Consistency of device usage
- Breadth of deployment across fleet/site

Best Use Cases

- Haul trucks
- Underground vehicles
- Employee transport buses
- Office (Management / Engineering)
- Control rooms
- Light vehicles and supervisors on night shift

Mining ROI - Improve Safety and Productivity - Bluewake Fatigue Mitigation

Value Beyond Direct ROI



FOR THE HUMAN

- Decision quality
- Increased alertness
- Better Sleep
- Healthy life

FOR THE BUSINESS

- Strengthens fatigue risk management systems
- Complements detection technologies (“mitigation + detection”)
- Supports HSE, ESG, and workforce wellness objectives
- Demonstrates proactive risk reduction to regulators and insurers

Conclusion

Bluewake represents a practical and financially sound investment in fatigue risk reduction and operational stability. Based on conservative modeling, deployment across 100 operators can generate approximately \$400K to \$2.0M+ in annual financial benefit, driven primarily by avoided high-cost fatigue-related incidents and supported by \$150K–\$500K in recovered productivity and downtime value. At the asset level, this translates to roughly \$4K–\$20K per unit annually, with typical payback achieved in under six months depending on site conditions. Beyond direct financial return, Bluewake strengthens fatigue risk management frameworks, enhances human performance reliability, and reduces exposure to low-frequency, high-consequence events that can exceed \$5M–\$10M+ per incident. As a result, Bluewake is not only a safety enhancement, but a disciplined, high-impact capital decision aligned with how leading mining operations evaluate risk, performance, and long-term value.