



# Mine Shift: The Williamson Diamond Mine In Tanzania.

EXAMINING GROUND DISPLACEMENT IMPACT ON MINES AROUND THE WORLD.

# The event

On Monday 7 November 2022, a significant 150m wide breach impacted the eastern wall of the tailings storage facility at the Williamson diamond mine in Tanzania.

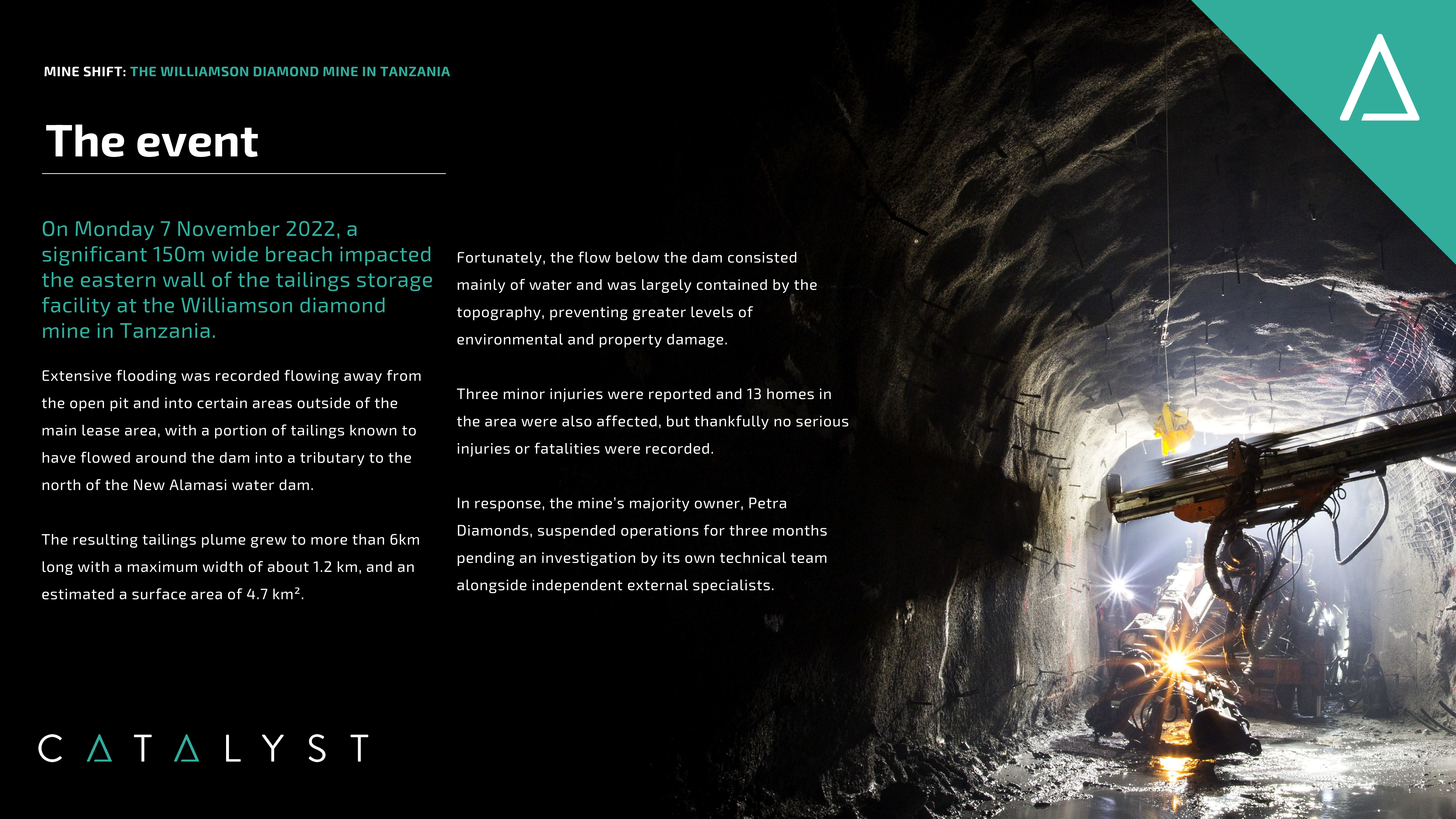
Extensive flooding was recorded flowing away from the open pit and into certain areas outside of the main lease area, with a portion of tailings known to have flowed around the dam into a tributary to the north of the New Alamasi water dam.

The resulting tailings plume grew to more than 6km long with a maximum width of about 1.2 km, and an estimated a surface area of 4.7 km<sup>2</sup>.

Fortunately, the flow below the dam consisted mainly of water and was largely contained by the topography, preventing greater levels of environmental and property damage.

Three minor injuries were reported and 13 homes in the area were also affected, but thankfully no serious injuries or fatalities were recorded.

In response, the mine's majority owner, Petra Diamonds, suspended operations for three months pending an investigation by its own technical team alongside independent external specialists.



# The event

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It appears that some of the original tailings wall material, including intact blocks, have been deposited on the downstream edge of the breach, especially on the south side.

There appears to be a step in the tailings at the site of the breach, suggesting a lower layer of denser tailings. This indicates that further releases could occur in rainfall.

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*BOB PETLEY, UNIVERSITY OF HULL VICE-CHANCELLOR AND LANDSLIDE SPECIALIST*



# The story of the Williamson mine

## KEY FACTS

Acquisition by Petra **2009**

Acquisition cost **\$10m**

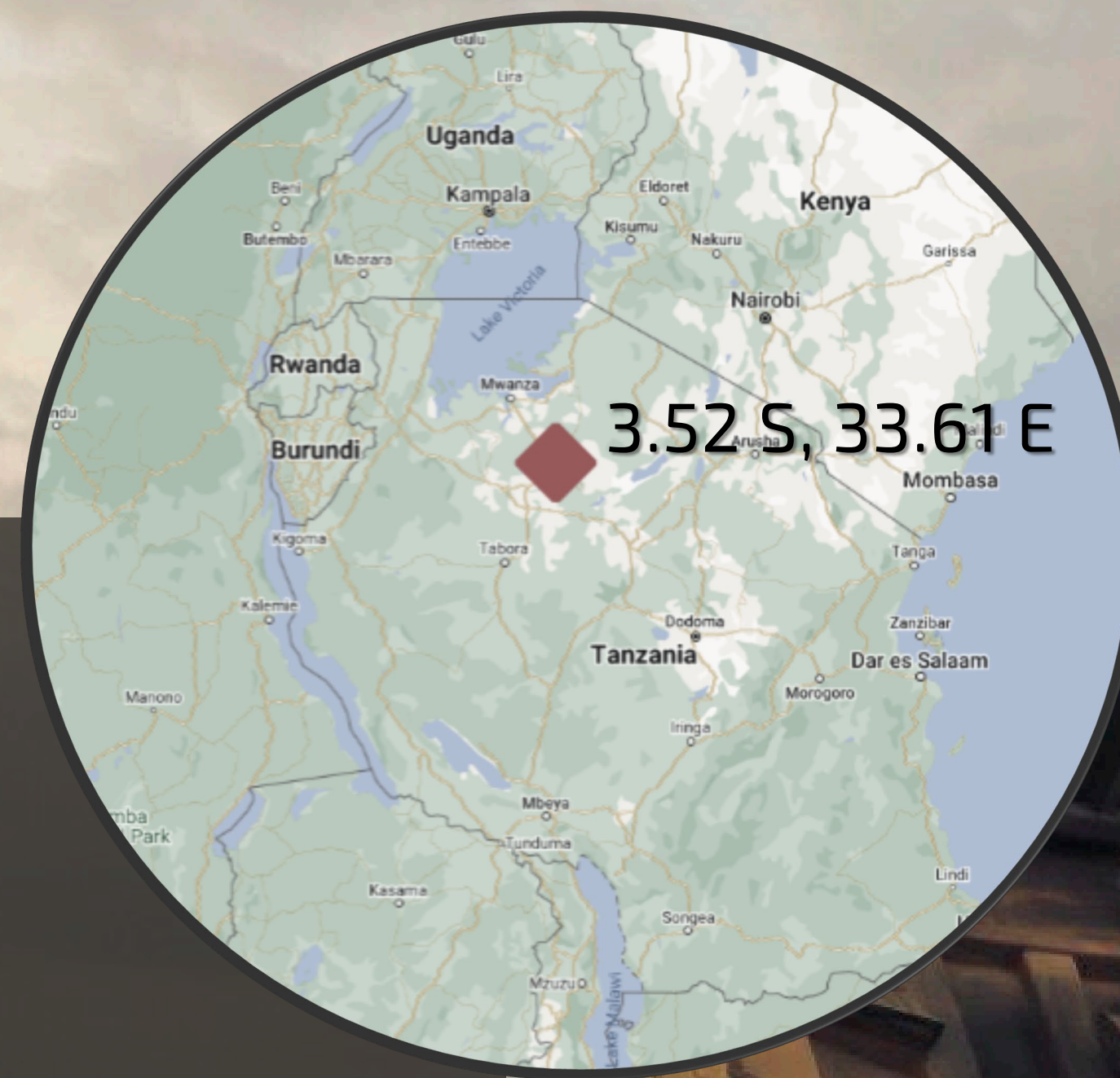
Ownership **Petra Diamonds: 75%**  
**Government of the United Republic of Tanzania: 25%**

Current depth of recourses **580m**

Mining method **Open pit**

Mining life **+50 years**

Mining plan **To 2033**





# CATALYST Analysis:

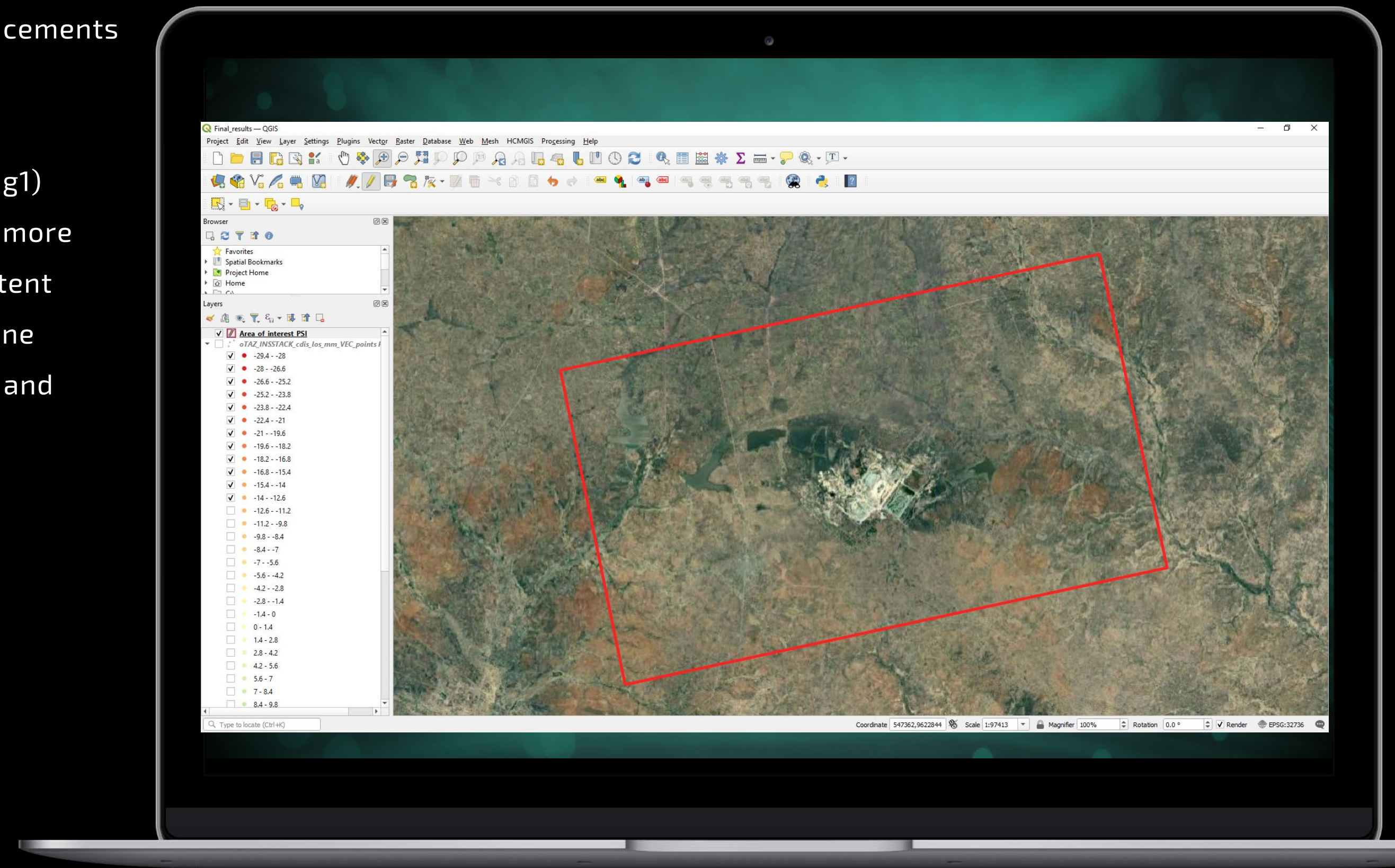
Using CATALYST InSAR technology, our team analysed ground behaviour surrounding the Williamson mine for one year prior to the failure, between October 2021 to November 2022.

The aim was to identify and measure +/- mm-level displacements that could provide early indication of tolerances being exceeded in terms of safety to maintain the integrity of the storage facility wall.

From that data we could then build a detailed historical picture of exactly what happened on the ground around the wall during that timeframe.

The results were striking. Throughout the year, we discovered a clear trend of significant, cumulative ground displacements at critical points on the site.

The process started with mapping (fig1) the entire area. This involved taking more than 840,000 measurements (persistent scatterers) across the Williamson mine to track ground displacement, speed and cumulative displacements.





# CATALYST Analysis (continued):

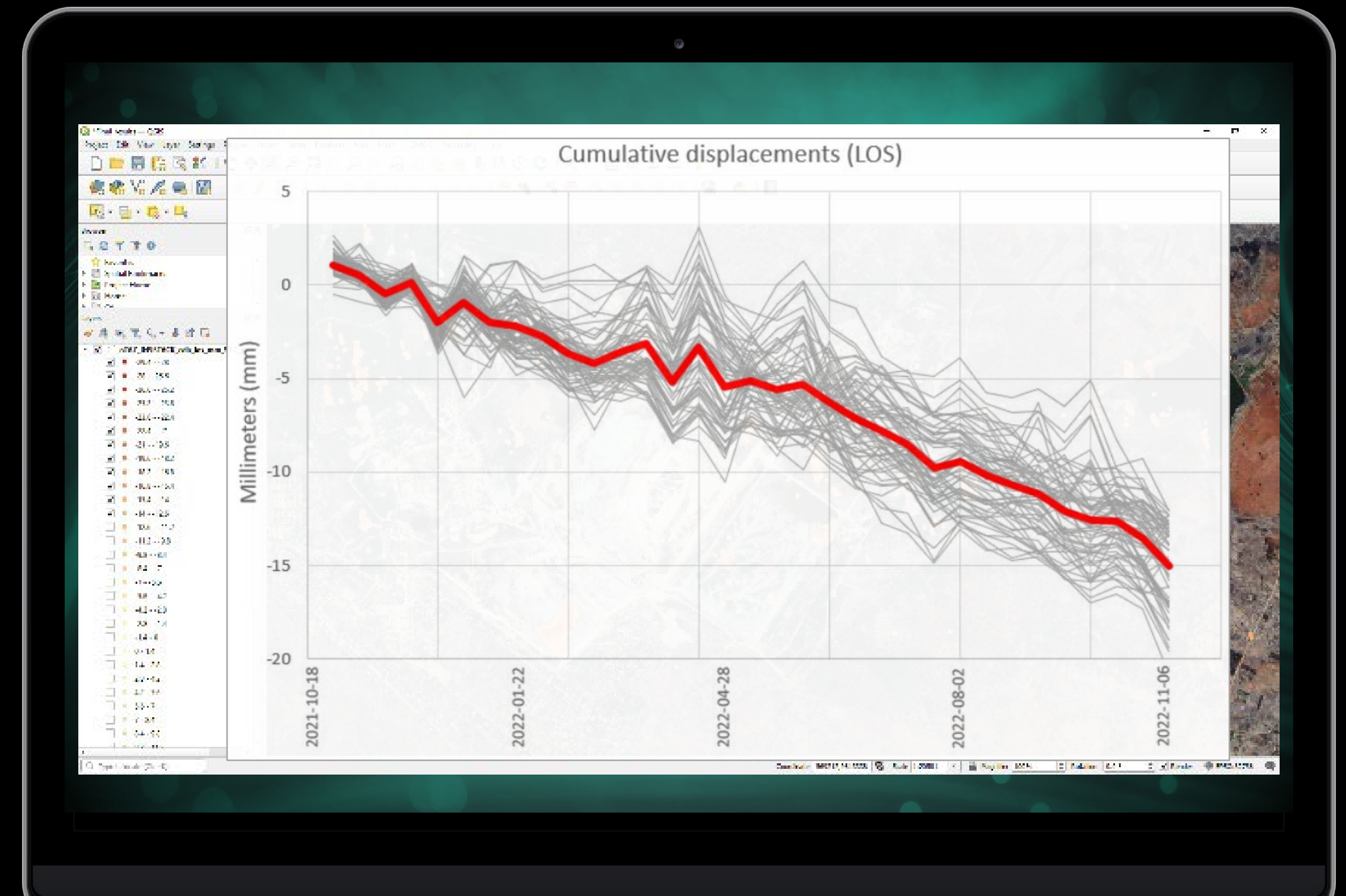
Once complete, we had identified a ground displacement range evident across the mine of -29.419mm to +34.039mm.

A considerable volume of measurements were recorded within a normal range of -12.6mm to 12.6mm and could be considered non-critical.

However, a small but very significant set showed high level of displacements at >12.6mm (0.085%) and >-12.6mm (0.49%).

When viewed in isolation - after removing the non-significant cumulative displacement points - you can see how the density and spatial clustering of critical displacement measurements (>12.6mm) are situated to where the breach occurred.

Through our analysis, we were able to determine that the ground displacement data uncovered spatial and temporal patterns that could have been used as early warning signs where closer monitoring would have been warranted.





# The value of this analysis

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The intent of our analysis, and indeed of satellite-based monitoring in general, is to highlight how the sensitivity to ground displacement can be used as an early warning indicator of areas that require more monitoring.

Satellite based displacement analysis coupled with in situ ground equipment and surveying can be used as an effective risk reduction solution.

Significant structural failures, breaches or collapses can occur suddenly, and they can have both catastrophic human and economic impact.

Traditional monitoring, maintenance, and risk mitigation strategies play a key role in preventing them, but they have their limitations, including operational costs and the potential safety of the maintenance teams.

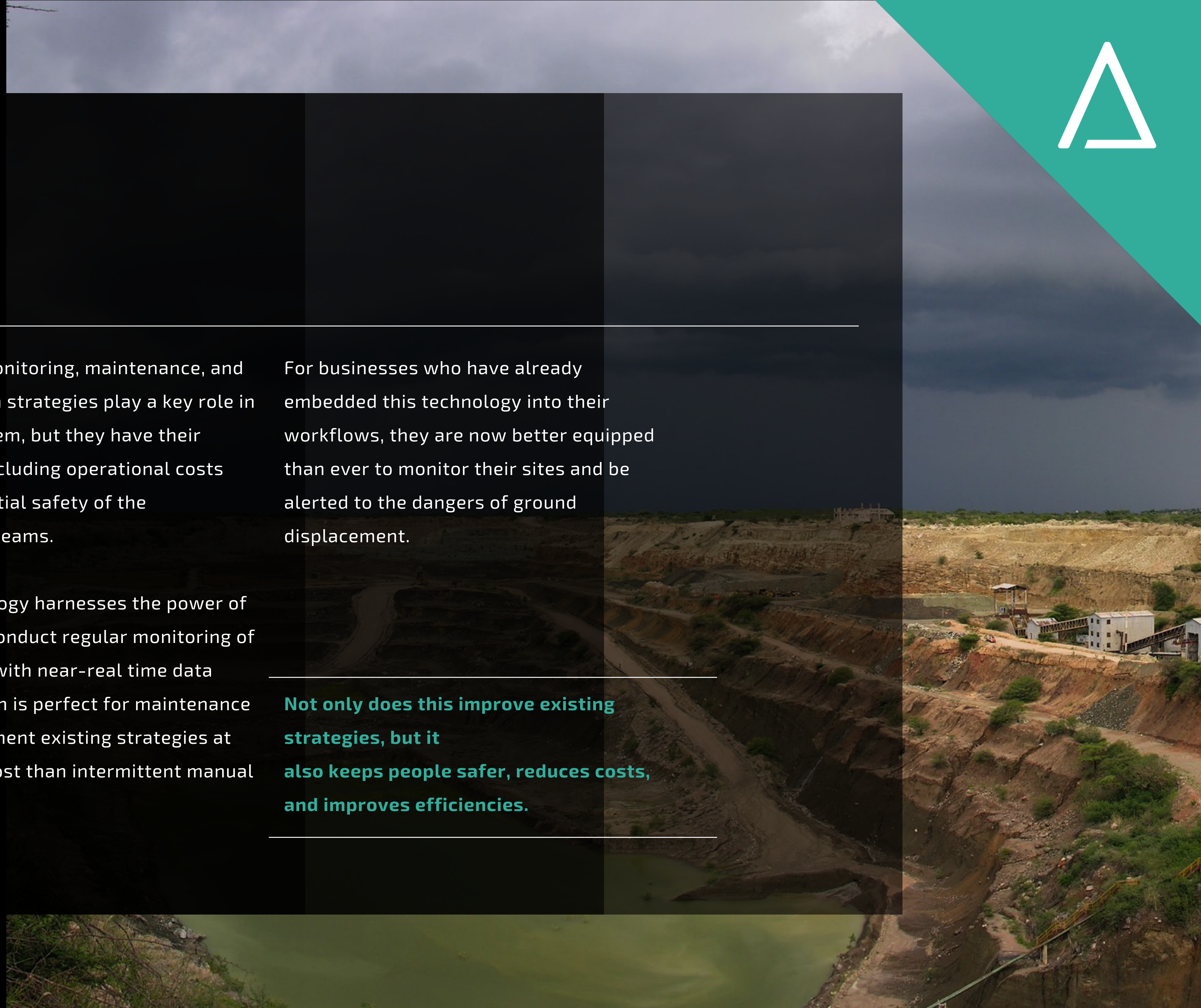
InSAR technology harnesses the power of satellites to conduct regular monitoring of critical sites, with near-real time data delivery, which is perfect for maintenance teams to augment existing strategies at much lower cost than intermittent manual checks.

For businesses who have already embedded this technology into their workflows, they are now better equipped than ever to monitor their sites and be alerted to the dangers of ground displacement.

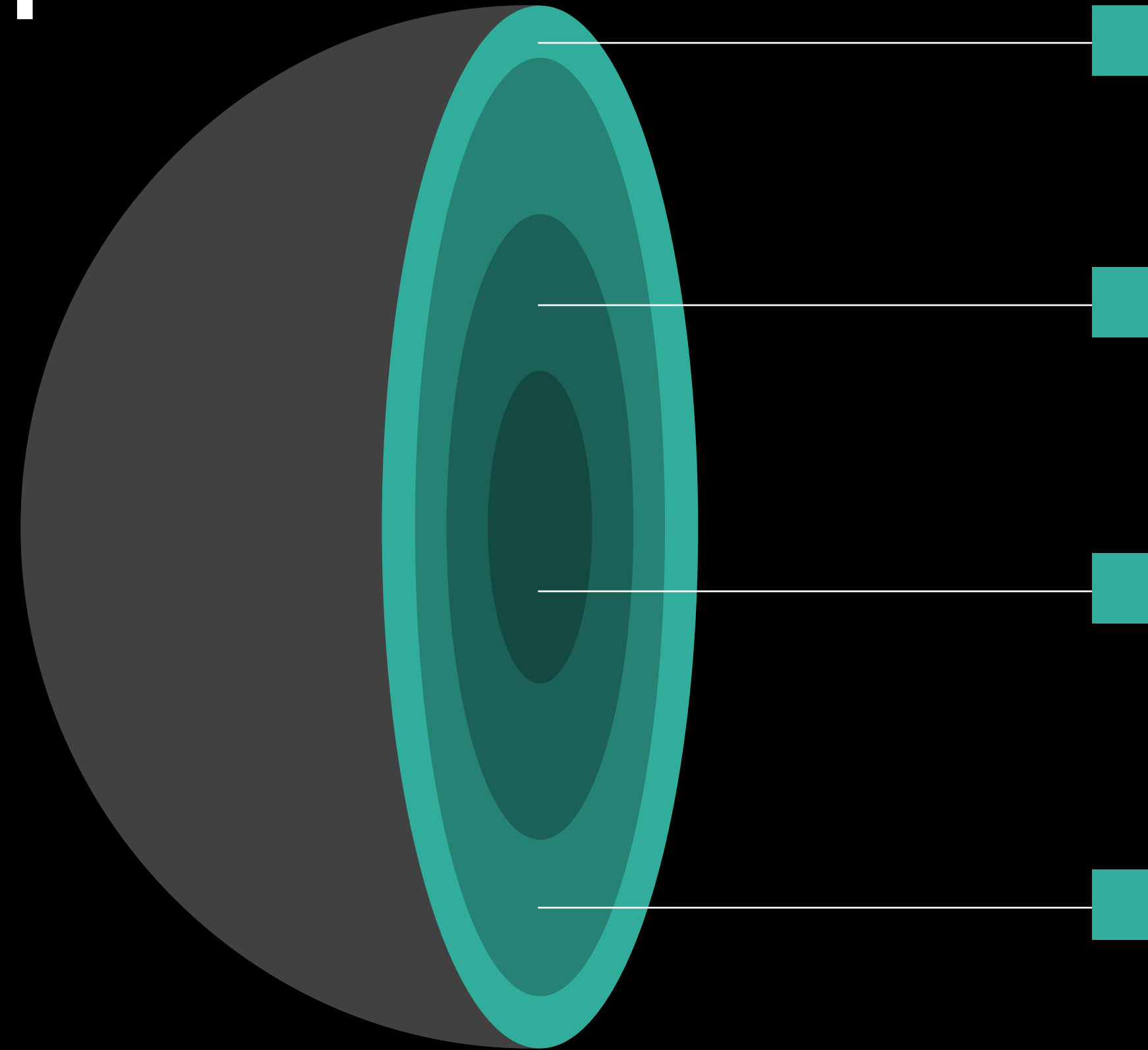
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**Not only does this improve existing strategies, but it also keeps people safer, reduces costs, and improves efficiencies.**

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# Discover what CATALYST can do for you



Earth observation and ground displacement technology is no longer a tool for the specialists.

Thanks to our cloud-based innovations, CATALYST solutions are available to all businesses, teams, and decision makers.

Integrated seamlessly into your workflows without the need for technology upgrades, they can have an immediate transformative impact on your strategies and outcomes.

**Discover what they can do for you.  
Get in touch with our team today.**







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