

# Wireless Monitoring Supports Tailings Dam Stability at Mina Condestable, Peru

How automated wireless monitoring provided continuous real-time data to safeguard tailings dam stability and support proactive geotechnical risk management.

Clients: MINA CONDESTABLE / DATAGEO / GEOBLAST

## Challenge

Maintaining the stability and integrity of any tailings dam is critical because of the potentially high-impact consequences that can arise in the event of failure. That's why a decision was made to implement an advanced slope monitoring system at Mina Condestable, in the Cañete province of the Lima region, Peru.

The site required continuous monitoring to ensure operational safety and stability, particularly given the potential consequences of undetected displacement.

The area is difficult to access, with challenging environmental conditions and high variability. This makes traditional, manual monitoring methods less efficient and increases the need for a reliable, automated solution.

## Solution

In collaboration with the appointed consultants HSS Senceive, working with Peruvian distributor DATAGEO/GEOBLAST, deployed a wireless monitoring system to provide continuous, near real-time insight into slope behaviour of the tailings dam.

Five wireless FlatMesh NanoMacro Tilt Sensors, mounted on metal stakes were installed at strategic locations to detect any near-surface rotational movement. Tilt sensor data was transmitted via a solar-powered cellular gateway. In addition, a FlatMesh camera was installed to provide automated imaging, day and night.

The wireless tailings dam monitoring solution was selected for its ability to:

- Deliver continuous data supporting a better understanding of slope behaviour without the need for frequent site visits
- Automatically trigger alerts and photos sent by SMS and email in the event of pre-set thresholds being exceeded



**Wireless monitoring system deployed to provide continuous, near real time insight into slope behaviour of the tailings dam**

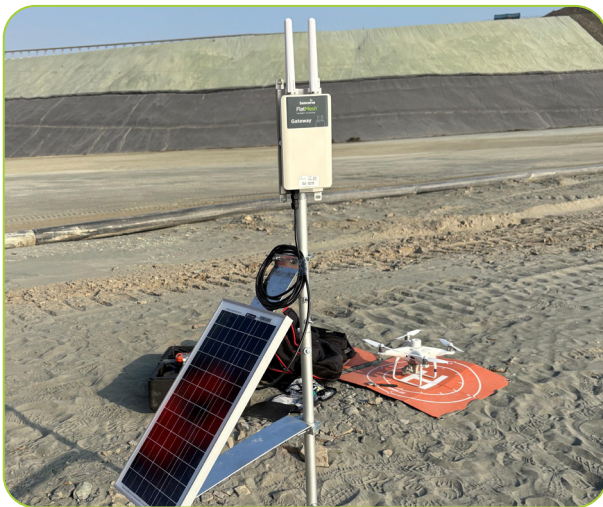
- Enable faster, more informed decision-making

The system incorporated InfraGuard event detection, which reports at user-defined intervals but can automatically “wake up” in response to ground movement. When triggered, the system sends immediate, graded alerts and activates the FlatMesh camera to capture images of the site.

This provides valuable visual context alongside sensor data, supporting faster and more confident decision-making in tailings dam risk management.

Topographic monitoring was also used alongside the wireless monitoring system as a complementary method.

Despite the challenging terrain and environmental conditions, the system was installed quickly and efficiently. The robust sensors can withstand both extreme temperature variations and impact damage.



**Tilt sensor data was transmitted via a solar-powered cellular gateway**



**FlatMesh NanoMacro Tilt Sensors, mounted on metal stakes detect any near-surface rotational movement**



**A FlatMesh camera was installed to provide automated imaging, day and night**

## Outcome

The Senceive system provided continuous monitoring of the tailings dam slope, giving the project team clear visibility of long-term trends and assurance that any sudden ground movement would be detected.

This data enabled:

- Improved understanding of slope behaviour and early identification of potential instability
- More proactive and informed geotechnical decision-making
- Enhanced operational safety at a high-risk site

By combining automated monitoring with real-time alerts and photographic images, the solution reduced reliance on manual inspections and ensured that any significant changes could be identified and addressed quickly.

The project demonstrates the value of wireless monitoring in complex, high-risk environments, delivering reliable data, even in remote and challenging conditions, to support safer and more efficient mining operations