

# LIDAR

MAY 2016

## MAGAZINE

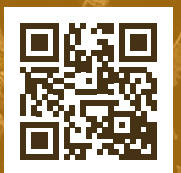


# MARCH OF PROGRESS

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## » Tailings Dam Survey

Quantifying risk is an essential part of risk management. Reliable and repeatable mapping of structures such as tailings dams helps operations to meet regulatory and safety requirements.

Maptek™ I-Site™ laser-based survey and monitoring systems provide a safe, accurate and cost-effective solution for dam wall stability monitoring. Capturing extremely detailed data enables advanced modelling and stability analysis. The Sichuan Academy of Safety Science and Technology (SCAST) has undertaken extensive surveys of tailings storage facilities across the province of Sichuan in southern China.

Sichuan is a mountainous region prone to earthquakes and landslides. A large earthquake in 2008 killed almost 70,000 people and left millions homeless. When tailings



Stability analysis can be conducted on detailed I-Site point clouds and accompanying digital imagery

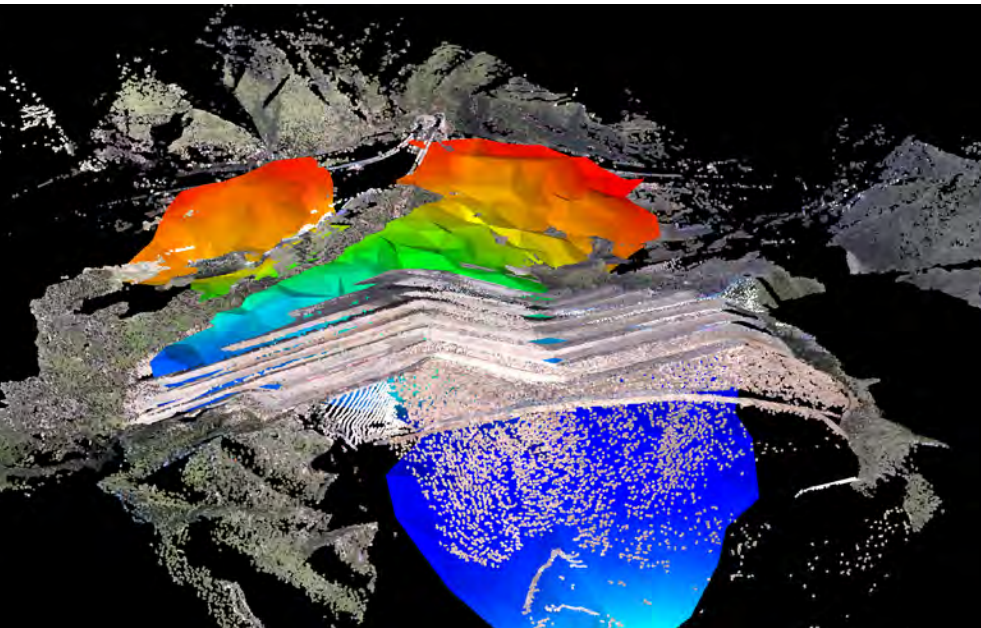
facilities are close to populated areas failure could have catastrophic consequences.

SCAST has deployed I-Site laser scanners to capturing detailed topographic information of structures and surrounding areas for various tailings storage facilities.

Scanning at a resolution of 0.1 degrees provides a good balance between speed of data capture and detail, with each scan typically collecting 2 million points in less than 5 minutes. Good vantage points can be hard to come by so easy operation and portability was essential for the project.

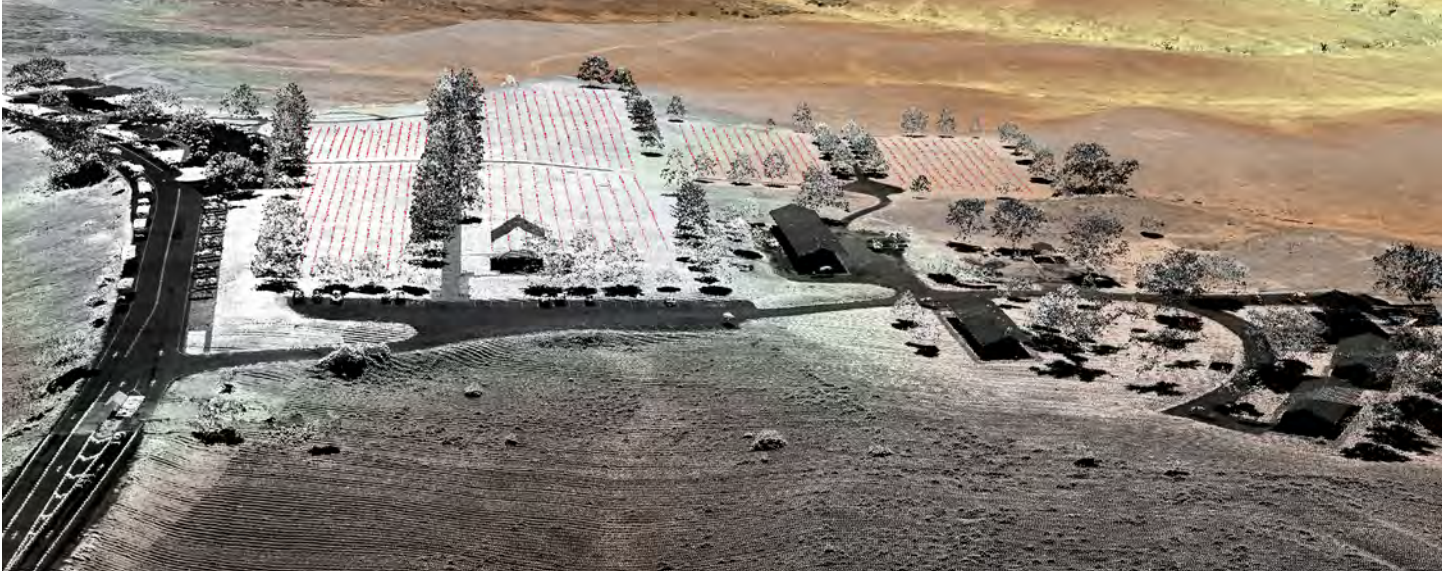
Water drainage channels were also surveyed with the resultant 3D topographic models applied to hydrographic modelling. Combined with rainfall statistics, this can help to determine if drainage channels are adequate. The 3D topographic model is useful for generating failure simulations, which in turn can be used as the basis for mitigation works.

The Maptek solution is flexible and easy to deploy. The wide coverage of I-Site laser scanners ensures a clear picture of surrounding areas in 3D, as well as detailed data for areas of interest. Repeated mapping allows a close audit to be maintained on the integrity of tailings dams and shows regulatory bodies that safety issues are being considered.



Pre and post failure simulation

For More Info, visit [www.maptek.com](http://www.maptek.com).

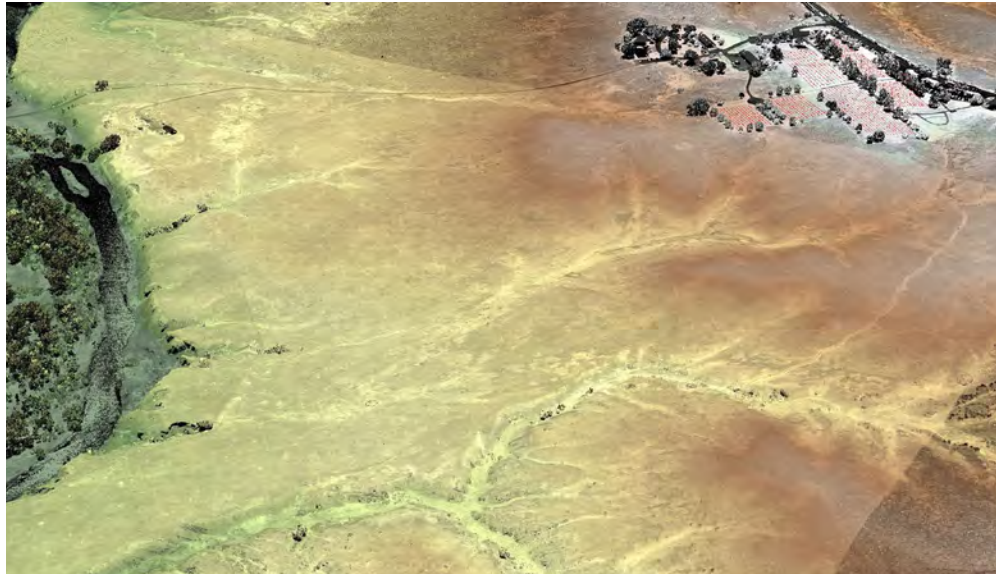


## » Bighorn National Monument Mapping Project.

In 2014, Woolpert was contracted by the National Park Service (NPS) for the Little Bighorn National Monument Mapping Project. The task was to map the locations of more than 4,320 headstone markers at Custer National Cemetery and over 280 battlefield markers in the 8.57-acre battlefield site.

Using lidar point cloud data at 12 points per square meter, a digital elevation model (DEM) and a digital surface model (DSM), Woolpert created a digital map and a semi-automated feature extraction technique to locate and identify general, Spanish War and Civil War styles of headstones, based on dimension and appearance. Woolpert developed a method that provided the centroid of each headstone from the lidar data.

As a result of this project, the NPS has an accurate dataset of the attribute information of each headstone—soldier information, condition, location, etc.—at Little Bighorn National Monument. The NPS reported that



this information also will be used to track the condition of these headstones, for restoration efforts and for an interactive map that directs visitors to headstones of interest.

Little Bighorn National Monument memorializes the June 25-26, 1876, battle between the U.S. Army's 7th Cavalry and the Lakota Sioux

and Cheyenne warriors in what was then the Montana Territory. A reported 263 soldiers died in the battle, including Lt. Col. George A. Custer, in what became known as Custer's Last Stand.

For more information, visit [woolpert.com](http://woolpert.com) or call 937-531-1258.

## » Bluesky Launches Soil Map of England and Wales Online

Aerial mapping company Bluesky and Cranfield University have launched an online map showing soil types across England and Wales. The National Soil Map has been created from soil datasets produced by Cranfield University and is designed to inform decision making in a wide range of applications, from land and infrastructure management to construction, habitat assessment and agriculture. It is a perfect complement to data layers already available from [www.blueskymapshop.com](http://www.blueskymapshop.com), including Bluesky's National Tree Map and 3D height datasets.

Working with environmental data scientists at Cranfield University's Soil and Agrifood Institute (CSAI), Bluesky can now provide the unique map that combines Cranfield's award winning NATMAPvector soil dataset, which lists almost 300 soil associations, with the more simplified Soilscaapes product.

"If you want to better manage your land, buildings, infrastructure or environment, understanding the soil is a great place to start. Soil is a fundamental building block for our ecosystem, and provides key support for, and threats to, our infrastructure and

buildings," commented Dr Timothy Farewell, Senior Research Fellow at the Cranfield Soil and Agrifood Institute. "The source data for the Bluesky version of the National Soil Map is the result of more than sixty years of soil survey work and took over 200 man years to create. Our soil data is already in use by most major water companies, many consultants and government bodies."

"This is the first time a dataset of this nature and complexity has been available to view and purchase online, and we are delighted to be working with Cranfield to ensure its wider application across a range of sectors," added Rachel Tidmarsh, Managing Director of Bluesky.

The Bluesky National Soil Map is created from two distinct soil datasets produced by Cranfield University; NATMAPvector and Soilscaapes. NATMAP Vector is the flagship soil data product from the CSAI. It is a 1:250,000 scale map of England and Wales, showing the locations of the 297 distinct soil associations wherever they occur within the countries. Soilscaapes is a 1:250,000 scale, simplified soils dataset covering England and Wales. It



was created with the purpose of effectively communicating a general understanding of the variations which occur between soil types, and how soils affect the environment.

The National Soil Map is now available from the Bluesky Mapshop ([www.blueskymapshop.com](http://www.blueskymapshop.com)), which already offers complete nationwide coverage of aerial photography, 3D models (Digital Terrain and Surface Models DTM / DSM), LiDAR data, Thermal Mapping and the National Tree Map.

*Bluesky is a specialist in aerial survey including aerial photography, LiDAR and thermal data using the very latest survey technology, including two UltraCam Eagles and an Orion M300 LiDAR system. An internationally recognised leader with projects extending around the globe, Bluesky is proud to work with prestigious organisations such as Google, the BBC and Government Agencies.*

*Bluesky has unrivalled expertise in the creation of seamless, digital aerial photography and maintains national "off the shelf" coverage of aerial photography, DTM and DSM through an on-going three-year update programme. By purchasing a world first sensor for the simultaneous capture of LiDAR, Thermal and Aerial Photography data, Bluesky is in the enviable position of being able to provide customers with unique and cost effective solutions.*

*Bluesky is leading the way in developing innovative solutions for environmental applications, including the UK's first National Tree Map (NTM), solar mapping and citywide 'heat loss' maps and is currently developing noise and air quality mapping products. [www.bluesky-world.com](http://www.bluesky-world.com)*





## »» Labyrinth Temple LiDAR Scan, New Harmony, Indiana

In February 2016, Qk4 documented a historic stone temple in the center of a hedge labyrinth in New Harmony, Indiana. The stone temple was reconstructed between 1939-1941 and now being documented for historic registry. Instead of hand measurement and photos of the structure, our FARO Focus 3D collected a color point cloud of the interior and exterior surfaces.

This is the first laser scan project Qk4 has completed for Cultural Resource Analysts, Inc. (CRA), an archeology and architectural history firm with offices across the U.S. The

ways LiDAR can capture existing conditions of structures, monuments, and archeological sites gives greater insights for historic analysis and preservation. The benefit of having point cloud documentation lies in the ability to measure minute deviation in surfaces, cross-section elevations, geographically monitor archeological sites, and model historic structures for digital archive. LiDAR seems to be a complete source for spatial documentation.

As Qk4 builds new experience in scanning for historic analysis, we hope to collect many

more registry sites for CRA and deliver high definition point clouds to preserve the evidence of our past.

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## » Rome's Invisible City

BBC ONE's 60 minute special Rome's Invisible City follows ScanLAB Projects and presenters Alexander Armstrong and Dr Michael Scott as they explore the hidden underground secrets of Ancient Rome. The

show explores Roman infrastructure and ingenuity, all below ground level. They journeyed via the icy, crystal clear waters of subterranean aqueducts that feed the Trevi fountain and two thousand year old sewers which still function beneath the Roman Forum today, to decadent, labyrinthine catacombs. Our laser scans map these hidden treasures, revealing for the first time the complex network of tunnels, chambers and passageways without which Rome could not have survived as a city of a million people.

The team experienced unprecedented access to some of Rome's most recently discovered treasures and most recent archaeological finds, guided by a Rome's Underground Archaeology Unit. Often access was complex but exciting - abseiling 20 meters down through a manhole cover into underground quarries or delicately picking our way in pitch black, water filled tunnels. The result is some of the most comprehensive scanning achieved in Rome, in an unprecedented level of colour, accuracy and detail.

3D Scanning forms the backbone to the show, capturing each location in millimetre detail for immediate, on screen investigation by

the presenters. While the scanning is an on screen event in itself, the processed scan data then forms the basis for the show's graphics, compiling a complex map of subterranean discoveries set within their ancient, and contemporary, aboveground context. Navigating the pointcloud we zoom into views of the entire Roman Forum to see the detailed construction of the Cloaca Maxima below. The scans highlight ancient pick-marks on the surface of quarry walls, the incredible coloured frescoes of Pagan burial chambers and the delicate carved frieze's within hidden Mithraic Temples.

### Processing

All locations were aligned using FARO Scene 5.2 (at the time the latest version of Scene available). Following filtering and automatic target detection and successful target based alignment was completed for all locations. Colour processing was completed in PTGui before application to the scan data in FARO Scene. Downloading, processing and alignment and exporting of ready to render data was completed in approximately 12 days.

For the documentary ScanLAB Projects completed the rendering of the pointcloud using both Bentley Pointools v8i alongside a series of in house rendering plugins developed for larger data sets.





## The Success of the x330

With the scale and scope of Rome's Invisible City the project would not have been possible without the FARO x330. With around 7 Days of on site time and limited access to locations the ability of the x330 to capture an enormous amount of data, at such a great range was instrumental to the success of this production. The inhospitable locations and limited access, combined with the ease of capture and visualisation of data from the x330, enabled the filmmakers to start relating both physical film footage to spatially generated computer graphics, creating a truly unique visual narrative. The ability to navigate from establishing above ground shots to the previously 'invisible' below ground context, created a dynamic visual spectacle that helped to explain the story behind Rome and why it was one of the greatest civilisations ever built.

*ScanLAB Projects are one of the UK's leading providers of large scale 3D scan data. They specialise in visualisation of pointcloud data for film, tv, advertising and the creative industries. Their work has been broadcast internationally and exhibited at leading cultural institutions across the world. They are currently working with leading architects, scientists, broadcasters and artists on a portfolio of projects worldwide.*

