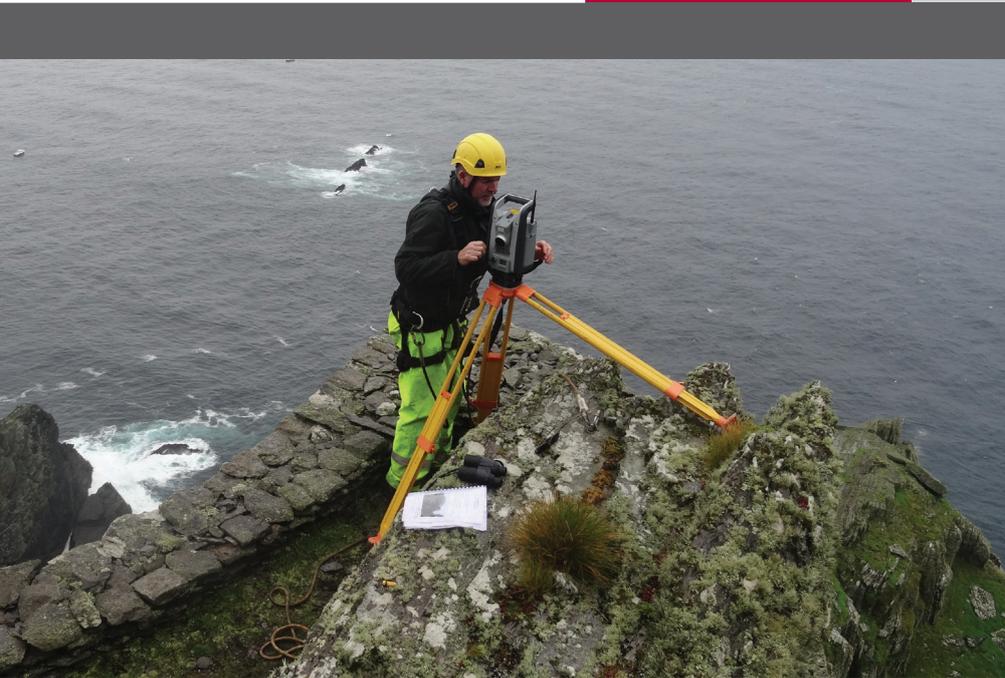


# Case Study

**Customer:**  
The Discovery Programme

**Project:**  
Monitoring Skellig Michael

**Solution:**  
Trimble S-Series Robotic Total Station



As a first step, three areas of the island were identified by the OPW's chief architect as being particularly vulnerable and an initial monitoring programme was

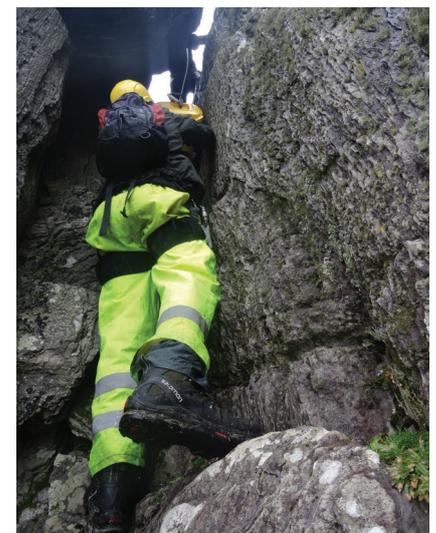
designed around these sites. 3D laser scanning was proposed and discussed as an approach but a network of survey control markers was felt to be a more suitable starting point. The network of survey markers comprised marine bronze bolts secured in drilled holes on the structural walls and surrounding bedrock. In September 2015, high quality geodetic measurements were taken to establish their 3D positions using the Discovery Programme's KOREC supplied Trimble S-Series Robotic Total Station providing millimetre precision coordinates for each control point.

“...This project demanded technology that could deliver the accuracy and precision we required in extremely harsh conditions.”

**Rob Shaw,  
Discovery  
Programme**

A year later, repeat observations, taken again with the Trimble S-Series, showed movement below the levels of significance. However, the success of the project led the OPW to extend the areas

are particularly challenging because the archaeological remains are largely dry stone constructed terraces, walls and buildings situated in extremely vulnerable locations. Any concerns about the stability of these remains therefore need to be addressed immediately.



▲ No easy way up!

## Skellig Michael “Imposing, isolated and beautiful”

An imposing and jagged rock with a summit towering 210m above the Atlantic Ocean. How the Discovery Programme used a high precision Trimble S-Series Robotic Total Station to monitor the captivating island of Skellig Michael.

Skellig Michael, situated 12km off the coast of south west Ireland, offers many attractions to the 180 visitors a day that land on the island during the tourist season. However, for another 45 million + people, it is far more recognisable as the location where Luke Skywalker was tracked down in the cliffhanger scene of the 2015 Star Wars film, “The Force Awakens”.

An imposing and jagged rock with a summit towering 210m above the Atlantic Ocean, Skellig Michael is a UNESCO World Heritage Site inhabited by several important colonies of sea-birds and was once home to an isolated community of monks. The monastery's stone beehive huts are believed to date back to the 6th century and can still be reached today via 600 steps, but only by those with a head for heights!

Responsible for maintaining and repairing this significant site is Ireland's Office of Public Works (OPW). These responsibilities

In order to do this, the OPW decided that regular monitoring of the most vulnerable areas of the site would be key to the early identification of any potential for structural movement or collapse. The OPW consequently enlisted the help of the Discovery Programme, an archaeological research company funded by the Irish Government through the Heritage Council. The OPW had worked with the Discovery Programme on projects in the past, including on Skellig Michael, and knew that the Programme's, Senior Geo-surveyor, Rob Shaw, and colleague Gary Devlin, would be prepared for both the geography of the island and the challenges its location would present.

Measured Solutions  
Construction | Surveying | Mapping





▲ Monitoring part of the ancient monastery on Skellig Michael

of monitoring to include the even more inaccessible and vulnerable areas of the south peak. This work was undertaken in September 2017.

### September 2017 – surveying the south peak

For Rob, initial considerations for the difficult south peak work included how best to collect the survey data accurately and safely in the demanding Skellig Michael environment. The island is accessible by boat alone so all logistics and equipment would need to be planned meticulously in advance. The south peak of the island can be reached only by rope so a suitably qualified and experienced rope access professional would also be needed to supervise the survey and ensure that surveyors and equipment alike were secure at all times. Additionally, Skellig Michael is exposed to strong winds, rain and sea mist. Patience would be needed to wait for the conditions most likely to provide optimum results but the pressure of time would dictate that some measurements would need to be taken when visibility was less than perfect if the work was to be completed within the two-day window.

With so many factors to be taken into consideration, Rob again selected the Trimble S-Series Robotic Total Station for the survey. The Discovery Programme has a long term working relationship with KOREC Ireland and knew that these instruments had a reputation for consistently delivering accuracy and precision in harsh conditions. Combined with the quality of the Trimble instrument's optics in less than perfect visibility and its rugged build, Rob felt it would be the most

reliable choice for the work.

On each of the two survey days, the total station was set-up in pre-determined locations using safety ropes as required. All the points in the network were observed using FL/FR, 5 average observations each to establish the coordinates of 4 resection points for each location and the structural targets. A repeat set of readings was done to give suitable redundancy to determine the baseline 2017 coordinates for the network.

The Discovery Programme also scanned the same areas of the island that were being monitored with the total station. A KOREC supplied 3D laser scanner was used for this and the Discovery Programme is actively researching with the OPW as to how this additional data may be used to reveal further important information on the nature of any structural deviations that are detected.

Rob reports that the OPW were delighted to have established a process of monitoring on one of the most important heritage sites in Ireland and that the results will be used to identify areas where intervention may be required to prevent serious collapse or decay. He concludes, "Skellig Michael is a spectacular place to work and I feel privileged to have had the opportunity to contribute to the protection of such an important heritage site. The Discovery Programme has a great working relationship with KOREC, spanning more than 20 years and a long history of using Trimble instruments. This project demanded technology that could deliver the accuracy and precision we required

in extremely harsh conditions. We needed to have complete confidence in our results and the subsequent statement that they would make on the stability of the structures. Our Trimble S-Series instrument delivered exactly that."

#### About the Discovery Programme:

The Discovery Programme is an archaeological research company funded by the Irish Government through The Heritage Council. Its remit has been to undertake long-term multi-disciplinary research projects to further the understanding of Ireland's past and covers the whole of the island of Ireland.

It has always placed an importance on the application of new technology in heritage and archaeology, and has a small technology section to undertake this research. This is increasingly collaborative work through EU funded research projects or, as in the case of Skellig Michael, working with other state agencies.

Rob Shaw is the Senior Geo-surveyor at the Discovery Programme. He would like to thank the OPW team working on the island; Grellan Rourke, Heritage Service, OPW; Brendan O'Connor, Rope Access; Owen Walsh, Boatman.

[www.discoveryprogramme.ie](http://www.discoveryprogramme.ie)



▲ Many thanks to Rob Shaw for supplying all information and images for this article.

## Contact us:

Please do get in touch for further information on any of the products or services mentioned in this case study, a demonstration, support or just a chat about your requirements.

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