

# Product Application Bulletin

CIVIL ENGINEERING AND CONSTRUCTION

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## Trimble MPS865, Siteworks, and Ohmex Sonarmite for small scale bathymetric surveys.

### Background

This bulletin covers an innovative workflow for small scale bathymetric surveys utilizing the Trimble MPS865 GNSS receiver, Trimble Siteworks field software, and SonarMite BTX echosounder.

Bathymetric surveys (the study of underwater depth) have been available to those with the knowledge and background of various sensors, software, and science<sup>1</sup>. Trimble has been a leader in transforming the way marine construction contractors perform work for over 30 years.

Eliot Sinclair & Partners (ESP) provides land development services by utilizing a network of land surveyors, landscape architects, planners, and engineers to develop projects with the best outcome<sup>2</sup>. Established in Christchurch, New Zealand in 1932, they have been a leading South Island consultancy with branch offices in Rangiora and Hokitika.



*Image 1: Bathymetric survey underway using the Trimble MPS865 GNSS receiver, Siteworks field software, and Ohmex Sonarmite echosounder.*

Bathymetric surveys are one of their specialties primarily in support of infrastructure development in the coastal zone, inland waterways and ports and harbours. Some of the many other applications their hydrographic department provides are:

Monitoring of sediment in bodies of water  
Surveys in support of marine construction

- Estuarine surveys.

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- Bridge pile scour surveys.
- Surveys for sewer outfalls.
- Extensive post-Canterbury Earthquakes
- Sequence inspections and surveys.

Being at the forefront of survey and land development technology, ESP takes steps to carefully consider and test new solutions to provide their customers with the most effective results.



Image 2: The survey vessel during mobilization.

## Goal

ESP performs many single beam echosounder surveys for marine construction support such as asbuilts of existing structures and seabed topography. Data sets from these sonar systems can be complex requiring education and knowledge on how to properly process and clean the data set into a useful deliverable. This can take up to 4 times longer than field survey which quickly adds up the time to deliver an end product.

The goal is to reduce the time and cost of creating a bathymetric survey plan for small scale shallow water projects. To cut down the time required for processing and data filtering, Ohmex has developed a driver for their Sonarmite single-beam echo sounder for

Trimble Siteworks field software. This allows the construction and land surveyor to efficiently collect 3D measurements with sonar depth measurements applied.

## Methodology

Recent advances in software and sonar technology is creating streamlined solutions for bathymetric survey contractors. The Trimble MPS865 GNSS receiver is a multi-purpose, all-in-one dual antenna, heading receiver<sup>2</sup>. It can be configured as a static base or on land rover using Trimble Siteworks software for operations such as construction stakeout and topographic data collection<sup>3</sup>. When it comes time for construction, the MPS865 receiver is paired with Trimble Marine Construction software to provide a complete dredging solution for on-machine operation.

Combining these solutions with the Ohmex SonarMite BTX echosounder<sup>4</sup> creates a complete system for small scale bathymetric surveys.



Image 3: The GNSS RTK base station used for transmitting corrections to the MPS865 receiver onboard.

Data was collected at 2 Hz (0.5 seconds) at a vessel speed of 5-6 knots (2.6-3.1 m/s) resulting

in a 3D position and depth collected every 1.5 meters of travel. Trimble Siteworks was set to Moving Vessel mode which allows the user to set a predefined time or distance to collect data automating the workflow and enabling the surveyor to pilot the vessel in confidence. With this software, the vessel operator can see in real time where data is collected to ensure they are achieving the desired survey coverage.



Image 4: The survey being performed in a harbor with the proposed system.

## Results

After de-mobilizing from the site, data was taken from the TSC7 Controller<sup>5</sup> (Windows 10 device) and imported into Trimble Business Center (TBC)<sup>6</sup> for processing and creation of deliverables. Little processing was needed as the sensed-depths from the echosounder were automatically applied to the 3D position of the GNSS sensor. Using the selection tools in TBC allowed for easy selection of any depths that were out of tolerance (too high or too low) which is typical when using echo sounder depth systems. These can occur from a variety of factors such as marine life and turbidity. From here, a surface model in the form of a TIN model (triangulated irregular network)<sup>7</sup> was

created to visually represent the harbor seabed. Applying contours and other above water features such as the wharf, slipway and banks help enrich the final bathymetric plan.

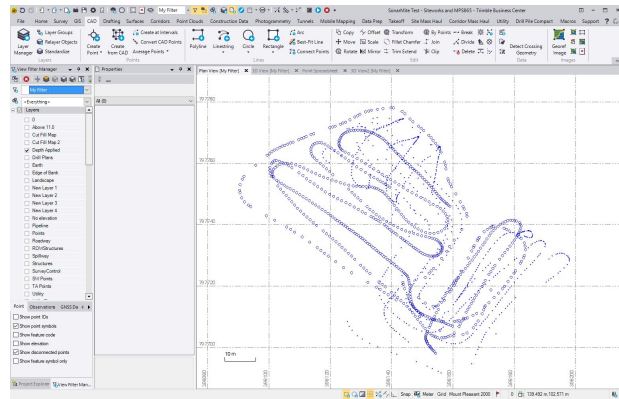


Image 5: The resulting point data files imported in Trimble Business Center for analysis and deliverable creation.

The field survey was completed in three hours time including mobilization and demobilization time to the job site. After this the data was processed and a deliverable created with an additional two hours - completing the job in just five hours of time.

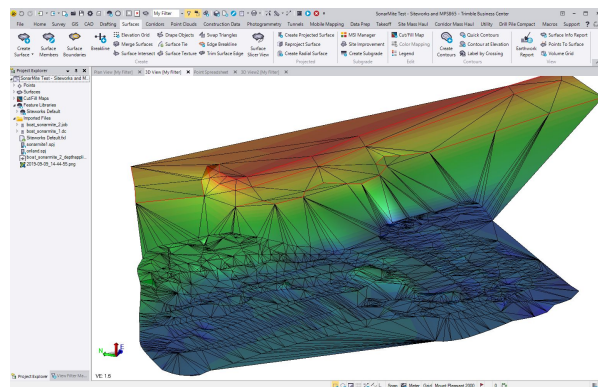
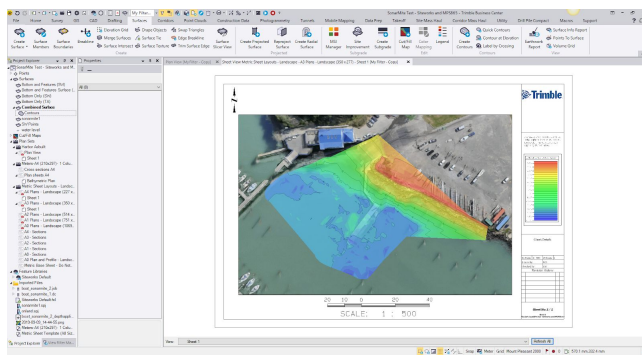


Image 6: Creating an existing feature surface model showcasing the seabed as well as near onshore features.



*Image 7: The finished bathymetric plan with a satellite image overlay displaying shaded above and below datum elevations in Trimble Business Center.*

## Conclusion

The entire survey was completed in just over a half days work. Combining the complete positioning system of Trimble Siteworks and the MPS865 with the Sonarmite BTX echosounder provided a simple, easy-to-use shallow water bathymetry system. Trimble Business Center survey data processing, surface, and plotting functions round out this workflow allowing the bathymetric surveyor to not only collect rich data but also provide the client with a finished deliverable.

Bathymetric surveying is a breeze with the Trimble positioning and software systems.

## More Information

For more information on Trimble Marine Construction contact your local Trimble regional account manager and visit [trimble.com/marine](http://trimble.com/marine)

Information on the SonarMite BTX can be found on the Ohmex webpage at <http://www.ohmex.com/>

## References

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