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CUSTOMER Benchmark Surveys **PROJECT** Trews Weir Condition Survey SOLUTION Trimble R12i GNSS, S9 Total Station, X7 3D Laser Scanner and TBC

## Delivering on time and beyond spec

Benchmark Surveys delivered an impressive range of deliverables on a recent condition survey of Trews Weir in Exeter by combining data from three different Trimble technologies: laser scanning, GNSS, a total station...and a boat!

Constructed several hundred years ago, Trews Weir is located on the River Exe in Exeter and has undergone various modifications and reconstructions over the centuries adapting to the changing demands of the environment. The area around the weir is currently extremely busy with development focused on renewable energy and environmental work whilst its upstream position relative to St. James Weir, which collapsed five years ago, also makes its condition of particular interest on many levels.

A condition survey was deemed necessary by the Environment Agency and therefore Benchmark Surveys, already familiar with the area through other projects, was commissioned to undertake the work. The EA spec cited a topographical survey of the weir and its surrounding area to include spot levels every 2.5m, heights, a building footprint, cross sections and as much detail as safely possible, all captured with a range of recommended sensors.

For Benchmark Surveys' Survey Manager, James Richards, one of xyHt's esteemed 23 Young Geospatial Professionals to Watch in 2023, the project offered a number of challenges but also an opportunity to focus on a single piece of work that would enable the team to bring together several of the EA's specified technologies and additionally, introduce 3D Laser Scanning.

#### A demanding project

The project was a complex one:

- The client had requested extensive survey detail but not all of the weir was safe to collect positions from.
- The survey detail required was extremely varied including changing elevations, the weir face, wall structures and metal retaining walls as well as riverbed and silt levels in moving water.
- Weirs can be dangerous to work on, especially near the outfall, requiring strict health and safety measures.
- The client required a single package for the deliverable so all the different datasets would need to be easily combined.
- The project would be weather dependent due to water levels.

Following an initial site walk, James and the team planned the survey. As a long-term Trimble user, he had the capacity to equip his team with three different technologies to carry out the work;



The Trimble R12i's TIP technology proved invaluable

### Trimble systems used on this project:

#### Top two benefits of the X7

- On-site registration ensured nothing was missed on the day
- Self-levelling for fast set up on banks and gradients

#### Top two benefits of the R12i

- The TIP technology for surveying quickly and safely
- it's always reliable, always works and there's never been a hardware issue

### Overall top benefit of using Trimble:

• It always works!



Aerial view of Trews Weir



GNSS (a Trimble R10 Base and R12i Rover), a newly purchased Trimble S9 0.5" Total Station for increased accuracy whilst establishing control and finally, an X7 3D Laser Scanner:

"On a project like this, we need total confidence in our methods and our equipment, especially when working from a boat. Trimble systems always deliver on site and of course they work in conjunction with each other for easy combining into a single dataset in Trimble Business Center. We were therefore able to plan a two-day survey with complete confidence that we would get the job done within our window of good weather when water levels would not be affected by rain."

#### **Combining technologies**

Over the two-day period a team of four Benchmark surveyors on day one, including two utility surveyors, and three on day two completed the job.

The Trimble R10 Base was set up in a safe area and the 0.5" S9 Total Station was used to establish good control around the structures ensuring accuracy across the whole job including georeferencing the point cloud generated by the X7 Laser Scanner and also to pick up any heights.

The X7 was used to capture as much of the structure as possible with the on-site registration feature providing visual checks that nothing had been missed before leaving for the day. Additionally, the self-levelling of the X7 meant that it could be quickly set up on banks and gradients.

However, James states that it was the R12i GNSS that stood out over the two days as they surveyed the riverbed and silt levels in the moving water plus any points on the weir that James could safely reach with Trimble's TIP Technology which allows points to be measured while the survey pole is tilted.

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James Richards, Survey Manager

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A new Trimble S9 0.5" Total Station was used to establish control



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Following the two days of field work, the data from the different sensors, also including drone data, was combined in Trimble Business Center and presentation to the client done through PDF, DWG, point clouds and E57 files. James concludes:

"The finished survey deliverables were completed on time and over brief to a long standing client. This has been absolutely my favourite project to date because it really showcased the talents of the Benchmark team, the weather was perfect and we had total confidence in our Trimble equipment which made the whole thing hugely pleasurable!"

#### How Trimble TIP Technology works

Using a Trimble receiver with IMU tilt compensation allows points to be measured or set out whilst the survey pole is tilted or tipped. This enables accurate measurements to be taken without having to level the antenna, allowing for faster, more efficient work in the field.

The inertial measurement unit (IMU) in the receiver uses information from acceleration sensors (accelerometers) and rotational sensors (gyroscopes) as well as GNSS to continuously determine its position, rotation, and degree of tilt, and correct for any amount of tilt.

- Measure accurate points quickly while standing or walking without having to level the pole
- Concentrate on where the pole tip needs to go, which is especially useful during setting out
- Easily survey hard-to-reach locations such as building corners
- No longer worry about movement of the pole when measuring, because the receiver automatically corrects for "pole wobble" when the pole tip is stationary

#### 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.

(UK) 0345 603 1214 (IRE) 01 456 4702

info@korecgroup.com www.korecgroup.com





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The R12i was used for riverbed and silt levels