

# Taking a Walk along the Bottom Line

## (Return on investment with rugged handheld computers)

Scotland's Environment Protection Agency uses mobile technology to save money on a long-term field data collection project.

There are many reasons that organizations might adopt new technology. The latest high-tech devices can make processes easier, faster, more accurate and more secure. And then there's the simple satisfaction some get from having the newest thing. But in the end, there's one overriding reason to invest in new technology: the bottom line. Return on investment is the key, so new technology makes the most sense when it can save big money.

That was the conclusion that drove the [Scottish Environment Protection Agency \(SEPA\)](#) to invest in more than two dozen Handheld Algiz 7 rugged tablet PCs to gather data for a pollution-assessment pilot project. Faced with a monumental undertaking in the midst of budget cuts, SEPA is using new technology that will potentially save more than £700,000 in just the first three years of a 15-year project.

## Data is the key to improving waterways

SEPA is Scotland's environmental regulator, with 1,000 personnel in 22 field offices charged with protecting and improving the nation's 78,000 square kilometers of land, which includes 25,000 lochs (lakes) and more than 125,000 kilometers of rivers and streams.

Nearly three-quarters of the country's land is in agricultural use, and the country's most significant environmental problem is diffuse pollution from agricultural activities. This is especially true of Scotland's waterways. And while 63 percent of them are rated as being in good condition, under the European Union's Water Framework Directive the Scottish government has committed to raising this figure to 98 percent by 2027.

SEPA has identified 102 "priority catchments" – waterway regions that need remediation under this ambitious plan. And the first step is to identify and classify pollution types and sources along every kilometer of the waterways involved. That will require some serious on-the-ground, in-the-field work: SEPA staff will walk the entire river network surveying each catchment, and will also perform farm-scale inspections across Scotland.

The first 14 priority catchments are scheduled to be completed by 2015. But all this work must be done within a current climate of severe public-sector spending cuts, which include a 20 percent reduction in staff.

## A pilot project to test a better way

Dr. Jonathan Bowes is a Senior Data Analyst/Modeller for SEPA, specializing in GIS data related to diffuse pollution. As a leader of the data-collection efforts for this project, he immediately saw a major problem with the current state of affairs – and technology: the massive amounts of field data required was being collected and recorded by hand. Field staff would have to walk the entire catchment, recording non-compliant agricultural practices (55 different types) as well as other details such as non-native species and fencing configurations... on paper. Then the data would have to be organized and entered manually into SEPA's central computer system. An extremely time consuming task.

As a GIS expert, Jonathan recognized the potential advantages of using technology to streamline the



### Challenge

Find a way to successfully complete a massive, long-term and labor-intensive field data collection project while cutting the budget at the same time.

### Solution

Shift from an archaic and time-wasting paper-based data collection process to a digital system, using rugged Algiz 7 mobile tablet PCs and customized GeoField software.

### Result

A streamlined process that increases accuracy, reduces time and labor needs in the field, speeds environmental improvement by providing better data faster and in a more usable format, and provides savings of more than 80 percent in labor costs.



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process. "The anticipated volume of paperwork involved in this exercise triggered the need for a fundamental change in the way SEPA collects data," he says.

So SEPA developed a pilot project to test the efficiency and cost savings of using rugged handheld computers in the field, equipped with project-specific software that would eliminate paper, and paperwork, from the equation. The South Esk Priority Catchment was selected as a pilot area for evaluating digital data capture technology in parallel with existing methods.

## Finding the best tools for the job

To ensure that the pilot not only proved the improved efficiency of digital data-gathering but also identified the best tools to use to do it, SEPA searched for the right resources. SEPA used an open-tender process to select the GeoField field mapping and data collection solution from [Sigma Seven](#), and chose rugged mobile computers from three different manufacturers to test in field trials.

"We selected GeoField as it is fast, lightweight, simple to use and fully customizable to SEPA's business needs," reports Jonathan, "Sigma Seven offered us a highly attractive, independent approach."

Knowing the project's needs well, SEPA identified several specific requirements for the mobile computers. They needed to be an all-in-one solution, meaning no auxiliary units or separate pieces. They had to have GPS location accuracy within 5 meters or less; be shock-, dust- and waterproof; weigh less than 1.2 kilograms; have long enough battery life to perform for an entire workday in the field on a single charge; and have advanced screen technology.

Those requirements narrowed the field quite a bit. And the winner that emerged was the Algiz 7, a super-rugged, ultra-mobile tablet PC from Handheld Group. The Algiz 7 offered everything SEPA needed and more, with a 1.6 MHz Intel processor and a massive 64 GB hard drive and 2 GB of RAM. The Algiz 7, featuring a 7-inch sunlight-readable MaxView touchscreen and running Windows 7, also has built-in GPS, fully integrated wireless communication and a 2-megapixel camera. It weighs just 1.1 kg, and its 2600 mAh dual battery pack delivers a full day's work and is even hot-swappable.

## Mobile technology process provides significant advantages

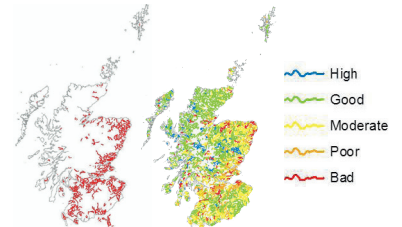
TWorkers dispersed throughout the South Esk catchment, gathering data along waterways using their tablets and software, assessing agricultural pollution sources as well as other water-quality impacts caused by factors including river engineering, non-native species and also good practice. A separate team surveyed the same area using pen and paper. And the results exemplified the reasons listed at the beginning of this article.

GeoField's customized software interface removes unnecessary fields and functions; ensuring data collection is consistent across all workers and highly accurate. Sigma Seven's consultative, task-oriented approach encouraged SEPA field operations staff to provide invaluable feedback from the trials allowing SEPA to fine tune their solution which in turn improved performance of the system in the field. "Working with Sigma Seven has allowed us to iterate through the development of the application to allow us to firm up the way it would look," says Jonathan Bowes.

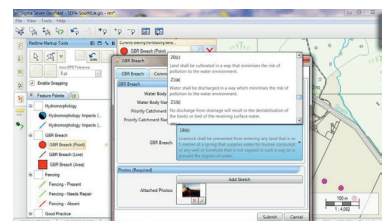
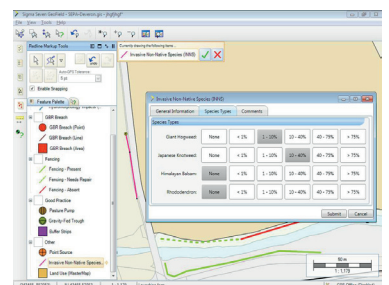
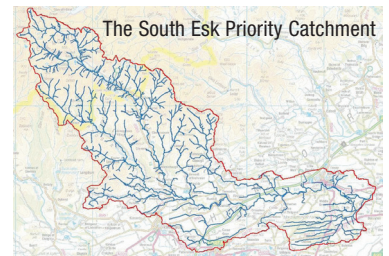
Electronic data collection virtually eliminates typos and errors, as well as problems with writing legibility, loss of writing utensils and the effects of weather on paperwork.

SEPA reported that the trial has allowed experienced field staff to use the system 'in anger' in a range of challenging conditions such as: rainy and muddy upland catchments, jumping fences and walls, being dropped and bashed, dense vegetation and in steep canyonised sections of rivers.

The data is secure within the ruggedized Algiz 7 hardware. Information is gathered and recorded in real-time, and uploaded nearly immediately into SEPA systems, which can easily and automatically create



Scottish waterways suffering from diffuse pollution from agriculture.



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reports and maps, as well as a full audit trail. So, yes, the process is easier, faster, more accurate and more secure. But what does that mean in the true test – savings?

## The proof is in the savings

SEPA were able to compare the South Esk catchment work with mobile computers to paper-based working, using a direct comparison of walking 400 kilometers of waterways using each method. The time savings were startling.

In the paper-based procedure, collecting data into field maps took the equivalent of 16 days of labor time; converting data to a spreadsheet took nine days; scanning the field maps into PDFs took 10 days; and importing the spreadsheet data into the SEPA GIS system took 10 days. Total time expended (and paid for): 45.5 days, and roughly £8,000 in labor costs.

The same data collection and processing using the mobile technology – from walking in the field to integration into the GIS system – took eight days of labor time, total.

That represents a savings of more than 80 percent in labor costs – or roughly £6,400. To put that into the context of the first project segment of just 14 priority catchments, the estimated labor savings are £708,000. And projecting that to the entire project of 102 catchments, the savings could be enormous.

## Evaluation straight from the field

Of course, focusing on cost savings is meaningless if the new technology isn't useful and the new process isn't effective.

SEPA have found the new system of data capture and storage greatly accelerates the process of environmental improvement. SEPA captures and stores field data quicker, cleaner but most importantly it can deliver survey and audit results back out to regulatory and science staff desktops via internal web-based GIS applications. It is here where non-compliance issues can be rectified with landowners much more rapidly which theoretically brings faster environmental response.

Jonathan Bowes summarizes: *"The whole cycle speeds up."*

And the feedback from the field has been highly positive. SEPA report that workers have found the Algiz 7 tablets to be *"usable and effective in day-long operation in rugged and remote terrain. And the digital data capture on maps is an efficient, accurate, robust and easy-to-use alternative to paper-based recording."*

The agency's official feedback report also mentions that the Algiz 7 is *"lightweight, and a perfect fit for your hand,"* that the MaxView screen offers *"excellent performance in direct sunlight, with minimal reflection,"* and that the battery life allows workers to *"easily get a full day of use with GPS on one charge."*

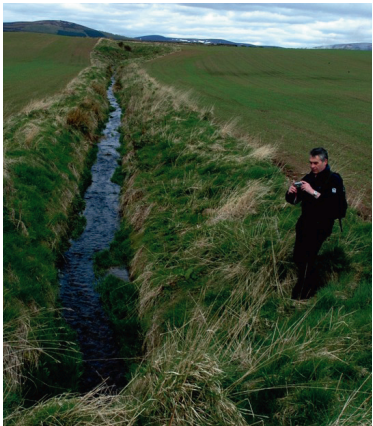
## A fully justified new direction

The pilot project has pointed the way to a streamlined future for SEPA's pollution-assessment initiative. After assessing roughly 12,000 kilometers of rivers using the traditional paperwork approach, SEPA is now transitioning to a purely digital capture system around 26 Algiz 7 tablets combined with the GeoField Exchange software that will integrate with SEPA's enterprise Oracle and spatial databases.

Why? Because the new technology is easier, faster, more accurate and more secure. But mostly because it's going to save an enormous amount of money. And you can't argue with that kind of return on investment.

We'll leave the final words to Dr Bowes: *"The project has attracted a great deal of attention across SEPA as this concept of paperless field work is applicable to almost everything we do. Potentially it could revolutionize major parts of SEPA's business."*

For more information about the Algiz 7 visit [www.ruggedalgiz.com](http://www.ruggedalgiz.com)



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