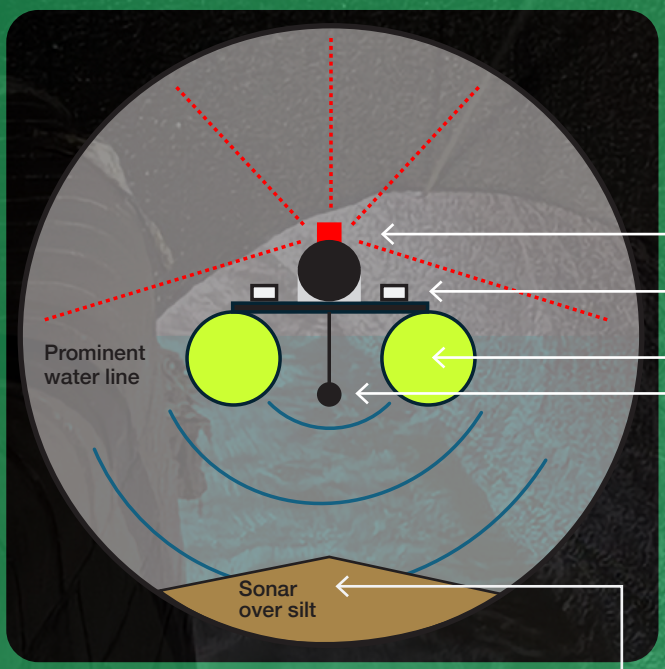
See More. Know More. Maintain Smarter.

Advanced Sewer Profiling and Coordination



LiDAR

Precision-mounted LiDAR sensors, positioned on the top and rear of the system, capture detailed 3D measurements of the pipe's profile, identifying deformations, geometry, and positioning with exceptional accuracy.

Camera

A high-resolution forward-facing camera, paired with advanced lighting, records 4K video and high-definition imagery ensuring clear visualisation of the pipe interior for condition assessment.

Float

A purpose-built float, designed to adapt to various pipe diameters, efficiently intergrates LiDAR, cameras, sonar, power, and data storage systems. It is pulled through sewer pipes from the surface, enabling streamlined data collection in challenging environments.

Sonar

Advanced sonar technology measures underwater pipe profiles, detects deformations, maps blockages and silt accumulation delivering a comprehensive view of the sewer's submerged conditions.

Silt / Obstructions

Accurately measure silt volumes and identify obstructions, enabling precise mapping of blockages and sediment buildup to prioritise maintenance efforts effectively.

Introducing a cutting-edge sewer inspection system, designed for simultaneous above and below water data capture.

Equipped with precision-mounted LiDAR and sonar technology the system delivers detailed 3D measurements of the pipe's real time position and profile including deformations and silt accumulation. Its high-resolution cameras provide clear 4K imagery of the pipe's interior while the float-mounted, self-contained unit operates independently, ensuring seamless data collection without the need for data streaming tethers. This advanced solution streamlines inspections, offering unparalleled efficiency and accuracy for comprehensive sewer profiling and maintenance planning.

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Case Study: Advancing Sewer Profiling for Optimised Maintenance

Background
Northumbrian Water Group (NWG) had been facing challenges in its sewerage network, specifically a reduction in flow capacity, which could potentially lead to spills into the environment, blockages and an escalation of maintenance costs. Preliminary inspections using traditional methods pointed to significant silt accumulation in certain sections, but the scale and depth of this silt were still unclear. Identifying the extent of the silt buildup was crucial for formulating an effective cleaning and maintenance strategy.

The Problem
The major challenge was the unknown quantity and distribution of silt within the sewer pipes. Without precise data on the depth of silt at various points in the network, NWG was unable to determine where to prioritise cleaning efforts, making it difficult to identify the most efficient approach. Additionally, limited access to the sewers made traditional manual inspections, such as physically entering the pipes, impractical and unsafe.

Phase 1: Initial Silt Profiling and Survey

The Challenge
A significant issue was the uncertainty surrounding the quantity and distribution of silt within the sewer pipes. Without precise data, prioritising maintenance activities was difficult, and traditional manual inspections posed safety and accessibility challenges.

The Approach
An advanced surveying system was deployed, integrating multiple technologies into a single mobile profiling platform. The key components included:

Echo Sounding Technology: Utilised to measure silt depth by emitting acoustic signals and analysing reflections.
Visual Inspection: High-resolution cameras provided real-time footage, confirming pipe conditions and supplementing acoustic data.
Calibrated Towing System: Ensured controlled movement through the sewer to maintain data accuracy.

Implementation

Surveying was conducted in multiple stages:

Preparation: Survey start and end points were mapped, and environmental conditions were assessed.
Data Collection: The profiling system was introduced into the sewer, where echo sounding and visual data were recorded simultaneously.
Analysis: Silt depths were mapped along the sewer network, correlating visual footage with acoustic readings to develop a comprehensive dataset.

Results and Insights

Identified Silt Depths: The survey highlighted sections with significant silt accumulation, with some areas exceeding 120mm of buildup.
Targeted Cleaning Strategy: Maintenance efforts were optimised by prioritising heavily affected areas, reducing unnecessary cleaning operations.
Cost and Time Savings: The technology-driven approach minimised the time required for inspections and improved resource allocation, leading to reduced maintenance costs.

Phase 2: Enhanced Profiling with Advanced Sensor Integration

The Challenge
While the initial survey provided valuable insights, additional accuracy was needed for submerged sections and irregularly shaped pipes so we sought a higher-resolution method to refine data collection.

The Approach
A second phase introduced additional technology for more comprehensive profiling:

Preparation: Survey start and end points were mapped, and environmental conditions were assessed.
Visual Inspection: High-resolution cameras provided real-time footage, confirming pipe conditions and supplementing LiDAR data.
LiDAR Mapping: Used to create a high-precision model of the sewer geometry and real world position above the waterline.
Enhanced Sonar Profiling: Provided 360-degree coverage of submerged sections, capturing highly detailed silt depth and obstruction measurements.
Integrated Data Collection: Simultaneous acquisition of LiDAR and sonar data ensured accurate correlation of results.

Implementation

Deployment Planning: Survey points were carefully selected, and safety protocols were established.
Data Capture: LiDAR scanners recorded the above-water sewer structure, while sonar technology profiled silt distribution underwater.

Analysis and Refinement: The collected data was merged into a detailed 3D model, enhancing maintenance planning.

Results and Insights

Improved Silt Mapping: The advanced LiDAR and sonar systems provided higher-resolution data, revealing additional areas of concern.
Customisable Profiling: The system's adaptability allowed adjustments in towing speed and sonar coverage to match different pipe conditions.
Optimised Maintenance Strategy: A unified 3D dataset enabled precise planning of future cleaning operations, reducing both cost and disruption.
Defects: Visual and measure defects such as collapses, spilling deformation, calcification etc.

Conclusion
By integrating multiple sensing technologies, this two-phase approach provided a significant improvement in sewer profiling accuracy. The detailed insights gained through LiDAR and sonar allowed for data-driven decision-making, ultimately enhancing the efficiency of maintenance strategies. This case study demonstrates how leveraging innovative technologies can optimise infrastructure management, reducing long-term operational costs and improving system reliability.

Academy Geomatic Q&A

What sets Academy Geomatics apart from other companies in the surveying and geomatics industry, and how do you believe your recent partnership with Northumbrian Water contributes to that differentiation?

Academy Geomatics stands out in the surveying and geomatics industry due to our commitment to innovation, precision and practical solutions that address real-world challenges—particularly in the water industry. Our expertise in geospatial technology enables us to bring structure and discipline to complex infrastructure projects ensuring efficiency, accuracy and sustainability in asset management.

Our recent partnership with Northumbrian Water is a testament to this approach. By integrating our advanced geospatial methodologies with their operational needs we are enhancing the accuracy and efficiency of water network mapping, maintenance and future planning. This collaboration allows us to leverage cutting-edge surveying techniques—such as LiDAR, UAVs and bespoke mapping technologies—to create comprehensive digital models of water infrastructure. These innovations not only improve asset visibility but also facilitate predictive maintenance and optimise resource allocation.

What truly differentiates us is our ability to transform data into actionable insights enabling asset owners to make informed decisions with greater confidence. Our geospatial expertise provides a structured disciplined approach to problem-solving ensuring regulatory compliance and operational excellence while supporting sustainability initiatives. Through this partnership, we reinforce our role as industry leaders in bringing technological advancements to water management ultimately driving efficiency, cost savings and environmental responsibility.

With technologies like LiDAR, sonar and other measurement technologies becoming increasingly important, how do you see their role in advancing both the company's capabilities and its reputation within the geomatics sector?

The integration of technologies like LiDAR, sonar and other advanced measurement tools is revolutionising the geomatics sector enabling us to measure and analyse areas that previously seemed impossible to survey with accuracy. At Academy Geomatics we recognize that while these technologies expand our capabilities the fundamental principles of surveying—precision, methodology and discipline—remain paramount.

By adopting and mastering these innovative tools we enhance our ability to provide high-quality geospatial data with greater efficiency and detail than ever before. LiDAR allows us to capture vast and complex environments in high resolution, whether above ground or beneath dense vegetation. Sonar technology extends our reach into underwater environments, improving hydrographic surveys and infrastructure assessments. These advancements enable us to offer our clients more comprehensive and accurate insights, ultimately improving decision-making, risk mitigation and project execution.

However, staying ahead in this evolving industry requires more than just access to new technology—it demands a keen eye on innovation. We continuously assess emerging tools to determine how they can complement and refine our existing methodologies while ensuring that traditional surveying principles guide our approach. This balance of innovation and discipline strengthens our reputation as industry leaders proving our ability to adapt, evolve, and deliver the most precise and reliable data solutions. By leveraging these cutting-edge technologies while maintaining the rigorous standards of our craft, Academy Geomatics continues to set new benchmarks in the geomatics industry.

If you were presenting a new, innovative inspection system to potential clients, what key benefits would you emphasize to demonstrate how it can address their specific needs, and how does your partnership with Northumbrian Water strengthen this offering?

When presenting a new innovative inspection system to potential clients we would emphasise several key benefits that directly address their specific needs, particularly in assessing deep-lying sewers for siltation levels. The primary drivers—health and safety, reduction in man-hours, and cost efficiency—would be at the core of our solution.

Enhanced Health & Safety – Traditional sewer inspections often require personnel to enter hazardous confined spaces exposing them to toxic gases, unstable ground and other risks. Our advanced inspection system utilising LiDAR, sonar and remote sensing technologies eliminates the need for physical entry in many cases. By deploying autonomous or remotely operated systems we significantly reduce the risks associated with deep sewer inspections.

Reduction in Man-Hours – The efficiency of modern scanning and sensing technology means that large sections of sewer networks can be assessed rapidly with minimal human intervention. This not only speeds up data collection but also allows for more frequent and proactive monitoring, reducing the reliance on manual surveys and labour-intensive inspections.

Cost Savings & Operational Efficiency – By streamlining the inspection process, our technology-driven approach reduces costs associated with labour, equipment and potential downtime. Early identification of siltation buildup and blockages enables proactive maintenance, preventing costly emergency interventions and infrastructure failures.

Our partnership with Northumbrian Water further strengthens this offering by providing real-world application and validation of these innovations. Working alongside Northumbrian Water allows us to refine and optimise our inspection systems in active operational environments ensuring that they deliver practical, measurable benefits. Additionally, our collaboration demonstrates our commitment to developing industry-leading solutions that align with utility providers' priorities, from regulatory compliance to sustainability.

By combining cutting-edge measurement technologies with a focus on safety, efficiency, and cost-effectiveness Academy Geomatics is redefining how sewer networks are monitored and maintained—helping clients make smarter data-driven decisions while protecting both their workforce and infrastructure.

For clients who might be unfamiliar with services like sewer profiling and maintenance planning, how would you effectively communicate the practical benefits and long-term value of these technologies?

For clients unfamiliar with sewer profiling and maintenance planning, the key to effective communication is demonstrating tangible benefits and long-term value in a way that resonates with their operational and financial priorities. At Academy Geomatics we focus on simplifying complex geospatial technologies and highlighting their real-world impact in four key areas:

Preventing Costly Infrastructure Failures - Sewer profiling provides a clear data-driven assessment of pipeline conditions, identifying siltation levels, blockages and structural defects before they escalate into major issues. By detecting early warning signs clients can avoid expensive emergency repairs, unplanned downtime and environmental penalties.

Improving Operational Efficiency & Cost Savings - Routine sewer maintenance without precise data can be inefficient and costly. Our advanced measurement technologies—such as LiDAR, sonar and 3D sewer mapping—allow for targeted, evidence-based maintenance ensuring that resources are allocated where they are needed most. This reduces unnecessary cleaning cycles and minimises labour costs, making operations more cost-effective.

Enhancing Health & Safety - Traditional sewer inspections often require human entry into hazardous environments, increasing risks of exposure to toxic gases etc. Our remote sensing solutions eliminate or significantly reduce the need for confined space entry improving workforce safety and reducing liability for clients.

Supporting Regulatory Compliance & Sustainability - Water companies and infrastructure managers face increasing regulatory pressure to maintain their networks efficiently while minimising environmental impact. By integrating proactive maintenance planning with high-accuracy geospatial data clients can demonstrate compliance, reduce overflow risks and improve water quality aligning with sustainability goals.

Delivering Value Through Innovation - By combining our expertise in geospatial technology with industry best practices, Academy Geomatics helps clients move from reactive maintenance to proactive asset management. Our collaboration with Northumbrian Water further reinforces our credibility, showing how these services drive real operational improvements and cost savings in a live network.

We communicate these benefits clearly through case studies, real-world data, and visualisation tools ensuring that even those unfamiliar with the technology can see the direct value of investing in sewer profiling and maintenance planning.

How do you envision the impact of launching a cutting-edge, self-contained inspection system on the company's brand, particularly in the context of its collaboration with Northumbrian Water and the broader industry's expectations?

The launch of a cutting-edge self-contained inspection system would have a transformative impact on Academy Geomatics' brand reinforcing our reputation as a forward-thinking, industry-leading provider of geospatial solutions. This innovation would position us at the forefront of the surveying and water infrastructure industries showcasing our commitment to safety, efficiency and technological advancement.

1. Strengthening Industry Leadership & Credibility
Developing and implementing a self-contained inspection system demonstrates our ability to solve complex challenges using the latest technology. It highlights our role as pioneers in geospatial innovation setting us apart from competitors who rely on traditional labour-intensive inspection methods. By delivering a solution that improves accuracy, reduces risk and enhances efficiency we solidify our position as a trusted partner in critical infrastructure management.

2. Elevating Our Collaboration with Northumbrian Water
Our partnership with Northumbrian Water provides a real-world testing ground and validation for this new system. By deploying the technology in an active utility network, we showcase its effectiveness in addressing real operational challenges—such as monitoring deep sewer siltation levels, minimising human entry and streamlining maintenance planning. The success of this collaboration enhances our credibility, demonstrating how our solutions create measurable value for major industry players.

3. Aligning with Industry Expectations & Future Trends
As the water and utility industries move toward more data-driven, automated and remote sensing solutions our self-contained inspection system directly aligns with these expectations. With increasing regulatory pressures, budget constraints and sustainability goals companies are seeking smarter, safer and more cost-effective ways to manage assets. By proactively meeting these needs, Academy Geomatics positions itself as a leader in the evolution of infrastructure inspection.

4. Enhancing Brand Recognition & Market Differentiation
The launch of this innovative system not only enhances our brand's visibility but also increases our market differentiation. It allows us to attract new clients across the water, transportation and municipal sectors who are looking for advanced, technology-driven solutions. The system's success would create opportunities for expansion and partnerships, further cementing our reputation.

5. Driving Long-Term Business Growth
By offering a cost-saving, high-accuracy and safety-enhancing solution we ensure that our clients—especially large-scale infrastructure providers—see the long-term benefits of working with us. The adoption of this technology fosters deeper relationships, repeat business and an expanded service portfolio that will drive sustained growth and industry influence.

The launch of a self-contained inspection system isn't just about technology—it's about demonstrating leadership, foresight and commitment to excellence. Through our collaboration with Northumbrian Water we reinforce our ability to deliver groundbreaking solutions that meet the demands of a rapidly evolving industry, strengthening our brand identity and market position for years to come.