

Case Study: Confined Space Drone Inspection at Northumbrian Water Group and Essex & Suffolk Operated Water Pumping Stations



Overview

In the realm of infrastructure maintenance and safety, the innovative application of drone technology has brought transformative changes. This case study delves into Team UAV's pioneering approach in utilising a confined space drone to inspect two wet wells within pumping stations operated by Northumbrian Water Group and Essex & Suffolk Water. These facilities, crucial in the management of fresh water, often pose significant risks and financial burdens when traditional inspection methods are employed. Team UAV's intervention not only enhanced safety and efficiency but also resulted in substantial cost savings.

The Challenges

Pumping stations, especially ageing facilities, or facilities with complex challenging access arrangements present unique challenges for inspection. Traditionally, these inspections required manned entry into confined spaces, posing significant risks to life and requiring extensive safety protocols. Additionally, the process can involve erecting scaffolding within these confined spaces, incurring high costs and extended downtimes, which will inevitably disrupt water supply and services for extended periods of time.





The Solution

Team UAV deployed a state-of-the-art confined space drone equipped with a ultra high definition 4k camera, LED lighting, a thermal camera and a precision LIDAR sensor to conduct the inspections. The drone was able to navigate the challenging environments of the wet wells safely and efficiently with the expert direction of Team UAVs Pilot. The LIDAR technology enabled detailed mapping and structural analysis of the wet wells without the need for physical scaffolding or manned entry. This approach not only eliminated the risks associated with confined space entry but also provided high-resolution data for precise assessment. The 4k camera and LED lighting allowed for an indepth inspection of the assets and structural components of the facility, whilst the thermal camera allowed identification of leaks within the wet well by identifying the cooler water and damp areas.

Key Benefits:

- **Safety:** The use of drones removed the need for personnel to enter potentially hazardous environments.
- **Cost-Effectiveness:** Savings of tens of thousands of pounds were realised by eliminating the need for scaffolding.
- **Speed:** The drone inspections were completed swiftly, allowing for a quicker return to operation of the pumping facilities.
- **Comprehensive Data:** LIDAR sensors provided detailed 3D models of the wet wells, offering insights that would be difficult to obtain through traditional methods.
- **Minimal Disruption:** The operational downtime of the pump stations was significantly reduced, ensuring uninterrupted water services.





Real-Time Monitoring and Problem Identification

During the inspection of the wet wells Team UAV's advanced drone technology enabled engineers to monitor the operation in real-time. This capability was pivotal for several reasons:

1. Immediate Visual Access: Engineers had direct access to the live feed from the drone's camera **and** LIDAR sensor. This provided them with an immediate and detailed view of the interior of the confined spaces, something that was not possible with traditional inspection methods.

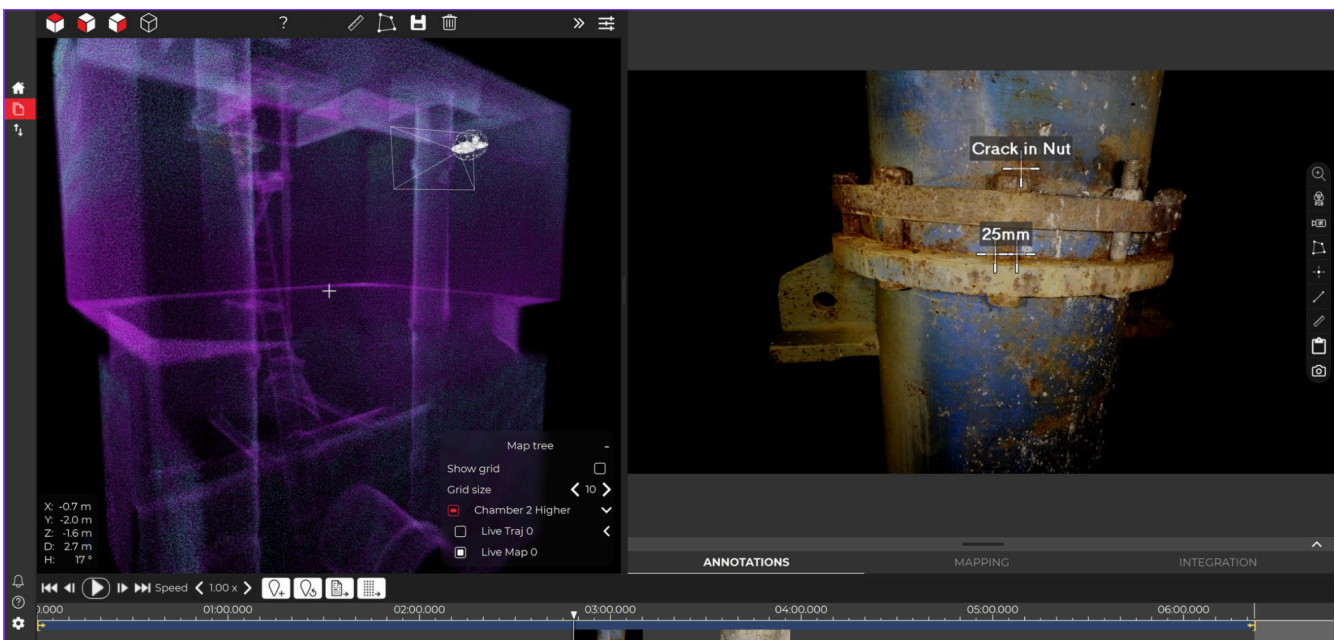
2. Instant Problem Identification: As the drone navigated the wet wells, any structural issues, anomalies, or potential hazards were immediately visible to the engineers. This real-time observation

allowed for instant recognition of new problems, a critical factor in environments where conditions can change rapidly or where previous inspections might have missed details.

3. Dynamic Inspection Strategy: The ability to identify issues on the fly significantly influenced the course of the inspection. Engineers could adjust the drone's path and focus areas based on the live feed, ensuring a more thorough and targeted inspection. This dynamic approach meant that no area was overlooked, and all potential problems were scrutinised.

Post-Inspection Data Analysis and Application

Once the inspection was completed, the data collected by the drone became a valuable asset for further analysis:



1. Immediate Data Availability: The data captured, including video and LIDAR point clouds, was promptly made available for interrogation on Team UAV's sophisticated software platform. This immediacy in data availability is crucial for timely decision-making and planning of any necessary remedial actions.

2. Versatile Data Usage: The software provided versatility in how the data could be utilised:

- Video Measurements: Engineers could take measurements directly from the video footage, allowing for a detailed analysis of the conditions within the wet wells.

- Point Cloud Analysis: The LIDAR data, represented as a point cloud, offered an accurate, three-dimensional representation of the wells. Engineers could extract precise measurements and conduct in-depth structural analysis from this data, enabling a level of detail and accuracy that was previously unattainable.

3. Long-Term Planning and Maintenance: The comprehensive data acquired not only served immediate repair and maintenance needs but also contributed to long-term infrastructure management. The high-resolution data provided insights for future planning, risk assessment, and maintenance scheduling, ensuring the continued safety and efficiency of the pumping stations.

The Result

The deployment of Team UAVs confined space drone at the Northumbrian Water Group and Essex & Suffolk Water operated pumping station marked a significant advancement in the field of industrial confined space inspections. Team UAV successfully conducted comprehensive inspections and LIDAR scans of both wet wells without risking human life, simultaneously achieving considerable cost savings and reducing operational downtime. This innovative approach not only helps set new standards in safety and efficiency for the water industry but also showcased the versatile applications of drone technology in complex industrial environments.



Lewis Pritchard, CEO of Team UAV, remarked, "We are at the forefront of an exciting and significant chapter in our confined space inspection programme. The introduction of drone operations in confined spaces is a notable advancement in the water industry, and our work with Northumbrian Water Group and Essex & Suffolk Water has been met with positive outcomes. As the scope of our confined space inspection service expands, we are increasingly recognised for our ability to adeptly navigate and operate in a variety of new environments. The integration of drone technology in these complex environments has not only been well-received but has also proven instrumental in reducing risk and cost with every survey we undertake. This progression not only showcases our commitment to innovation but also cements our role as leaders in this field.