



ENVIRONMENTAL
MONITORING
SOLUTIONS

part of  CuraTerra

CENTAURTM

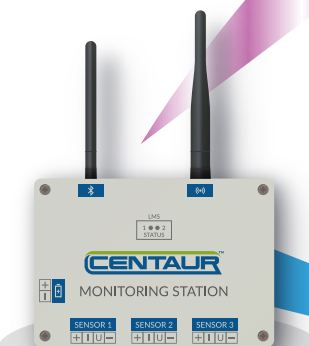
ACTIVE SYSTEM MANAGEMENT TO REDUCE STORM OVERFLOWS



- ✓ Reduce spill frequency and volume through intelligent use of existing infrastructure
- ✓ Autonomous system based on Artificial Intelligence
- ✓ Easy deployment, maintenance and operation
- ✓ Low carbon solution
- ✓ Forms part of long-term adaptive planning

CENTAUR™ is an autonomous, localised system which utilises existing network storage capacity

- ✓ Reduce flood risk
- ✓ Prevent spills from CSOs
- ✓ Control flows to pumping stations and wastewater treatment works
- ✓ Less costly than capital, space intensive, engineering solutions
- ✓ Complements traditional approaches and Green Infrastructure



Urban Flooding
Target Site

Sewer Overflows
Target Site

Target Site
Wastewater
Treatment Works

What is CENTAUR™?

CENTAUR™ is an intelligent, autonomous, localised system that utilises existing drainage network storage capacity for urban flood risk reduction and similar applications. The novel technology boosts sewer network capacity by using a gate to control the flow and optimise latent storage capacity.

How does CENTAUR™ work?

Each CENTAUR™ system involves the installation of water level sensors at key points within the sewer network. Level information is communicated using a proprietary radio protocol to the CENTAUR™ Hub. The modular system uses Fuzzy Logic-based Artificial Intelligence to dynamically control the pass forward flow.

How can CENTAUR™ be used?

CENTAUR™ systems can be used anywhere within the sewerage network where there is a target location with mobilisable storage upstream. It will automate the management of the control structure to control flow into CSO chambers, reducing spill frequency and volume, enabling flood relief, or delivering controlled and consistent flow into pumping stations and treatment works.

A key feature is once installed, it will always be optimising flow into the target location. This means it can be deployed early as part of wider catchment management schemes to provide upfront benefits. It provides long-term protection from future change as part of an adaptive plan once catchment solutions are implemented.

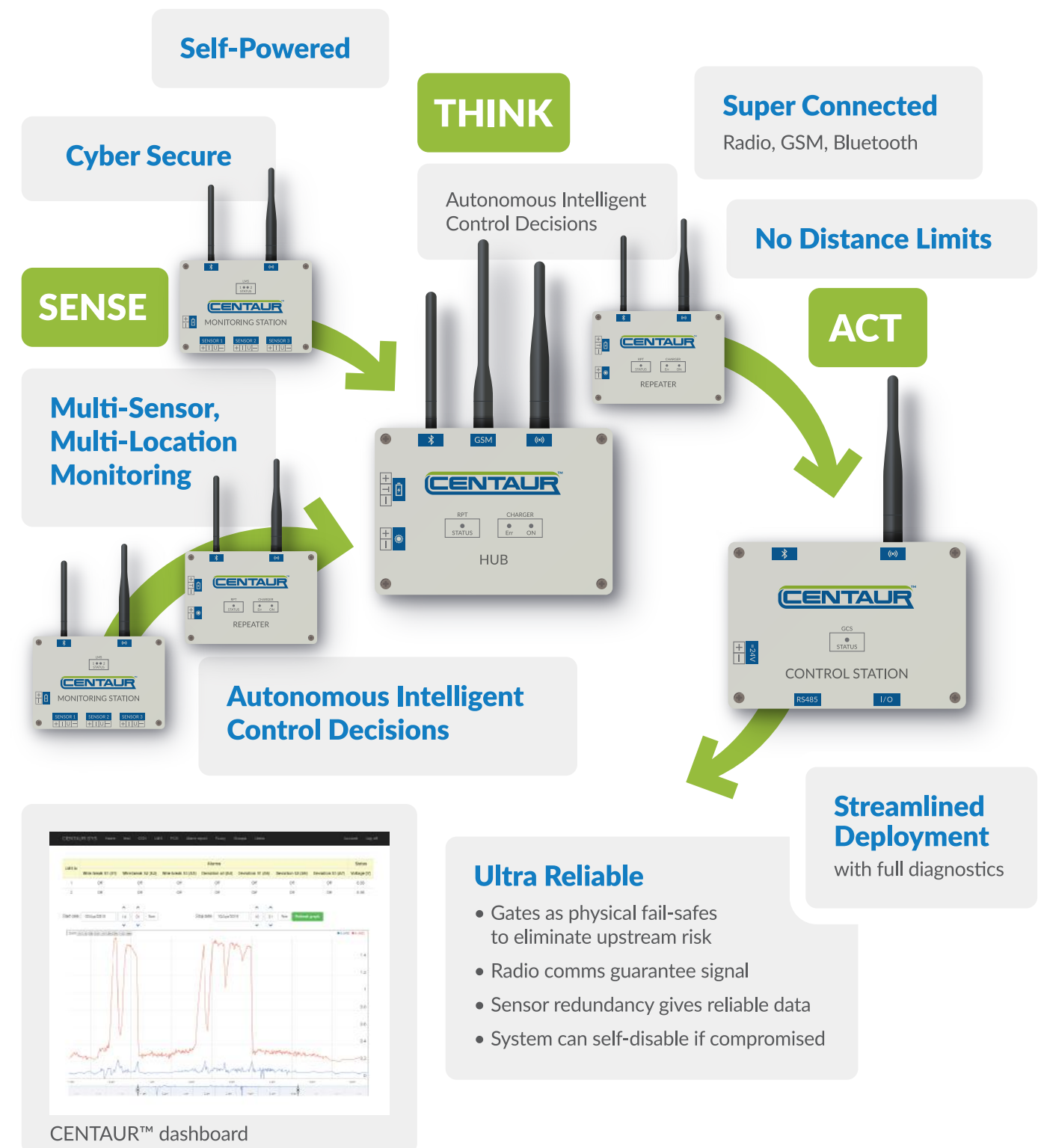
CENTAUR™ is protecting a World Heritage Site in Coimbra, Portugal, which has been prone to flooding in the past.

The system in Coimbra has performed flawlessly since commissioning in October 2017. The CENTAUR™ solution has controlled over 60 events in this time, including a 2-year return period storm event.

CENTAUR™ has effectively reduced the downstream CSO spill frequency and volume by 78% and over 87% respectively.¹

“The CENTAUR™ system has been successfully working in Coimbra, managing peak flows and reducing flood risk in an important area of the city. Through utilising existing storage capacity within the wastewater network, volume is retained during periods of intense rainfall and only discharged once the flow has reduced downstream.”

Telmo Paula, Aguas de Coimbra



¹ Simões, N., et al. (2018) Real-time CSO spill control using existing in-sewer storage, 11th International Conference of Urban Drainage Modelling (UDM), Palermo, Italy, 2018.

Modelling CENTAUR™

The ability to model CENTAUR™ is now a feature of the industry-standard software Innowyze InfoWorks ICM, used across the UK water industry to manage urban drainage networks. Anyone with the software can plan, configure and test CENTAUR™ gate solutions using the Fuzzy Logic embedded within the system, providing a direct simulation of site performance.

CENTAUR™ optimisation scenarios can be simply generated as part of day-to-day modelling strategies, such as Drainage and Wastewater Management Planning (DWMP) and overflow/flooding improvement schemes.

This functionality also means that forecasting of CENTAUR™ performance and its impact on asset performance can be simulated within ICM Live, enabling the forecast of real-time benefits to support investment planning.

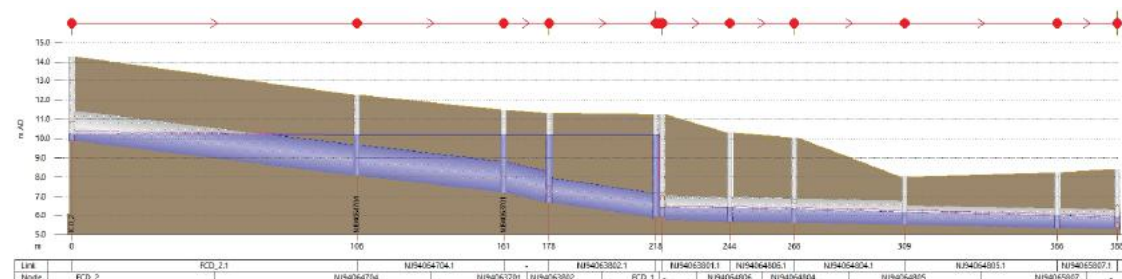


Locating Existing Storage Capacity within Wastewater Networks

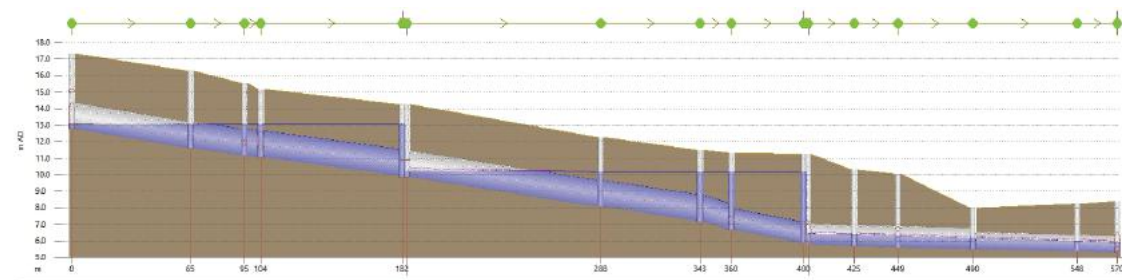
Periods of intense rainfall are simulated and the amount of available storage that exists upstream of the target site is observed using Long Sections.

Physical limitations, such as cellars, are considered in the selection of candidate storage sites.

It should be noted that for sewer overflow spill management, CENTAUR™ can often drastically reduce the volume and frequency of spills through the use of very small amounts of adjacent upstream storage.



One Gate CENTAUR™ System utilising 208m³ of Storage Capacity*



Two Gate CENTAUR™ System utilising 295m³ of Storage Capacity*

*based on a 1-year return superstorm event

Owning and Operating CENTAUR™

CENTAUR™ can have a high impact for low cost, but the system has further advantages.

Installation

A feature of CENTAUR™ is its low disruption and ease of installation.

CENTAUR™ modules are mounted on lamp posts or other convenient structures, or in manholes. They are self-powered either by solar (above ground) or battery (below ground) with a minimum 5 year battery life.

The only minor works required are at the gate manhole, where a small kiosk with a single-phase power supply, and a 50mm diameter duct to the manhole are required. For larger gates, a three-phase power supply and an enlarged manhole lid may be required, but the gate will likely be solving a problem that justifies this expense.

EMS has the capability to install and commission CENTAUR™ systems. However, you may want to service this with existing contractors. EMS remains flexible and can provide these services or support other parties.

Ownership

For long-term deployment, e.g. over a period of 20 years, the most economical solution is for the client to buy and own CENTAUR™. In this case, EMS can assist in whole-life cost analysis to give a full understanding of the cost of ownership.

CENTAUR™ may be used in shorter-term deployments. For example, the system may be deployed for a period upfront of a larger scheme, used to mitigate risks in the interim. In such cases, it may be preferable for the client to lease this system. Leasing can be bundled with installation, operation and maintenance.

Data

We work with our clients to integrate CENTAUR™ data streams into existing telemetry systems, giving them real-time visibility of data and system performance.

Operation and Maintenance

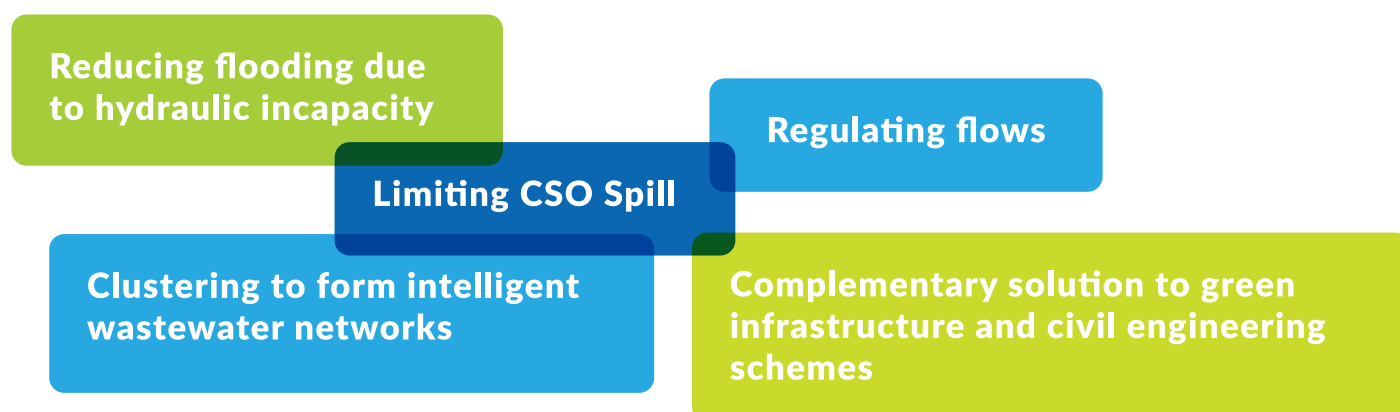
CENTAUR™ is autonomous. It doesn't require oversight by operational staff. It is also designed to be reliable and require little maintenance.

The system reports faults by exception. However, CENTAUR™ was designed for ultra-reliability, with redundant sensor operation, and with operational fail-safes, for example relief weirs and self-disabling features. Hence, faults should be few and far between and will be minimised by annual preventative maintenance. EMS recommends an on-site check once a year.

We have installed CENTAUR™ systems for two large UK water companies, and we provide full training to their operations teams to allow them to manage their sites.

CENTAUR™ Use Cases

Autonomous systems are able to sense, think and act in isolation. They are able to adapt to circumstances and evolving infrastructure. Through mimicking and replacing human reasoning, autonomous systems perform narrow tasks very effectively.



There are other potential use cases where CENTAUR™ can be used as a technology platform for irrigation, potable networks and wastewater treatment.

Contact

 www.em-solutions.co.uk

 +44 (0) 114 272 2270

 info@em-solutions.co.uk

 [environmental-monitoring-solutions](https://www.linkedin.com/company/environmental-monitoring-solutions)

 [@EMSolutionsLtd](https://twitter.com/EMSolutionsLtd)