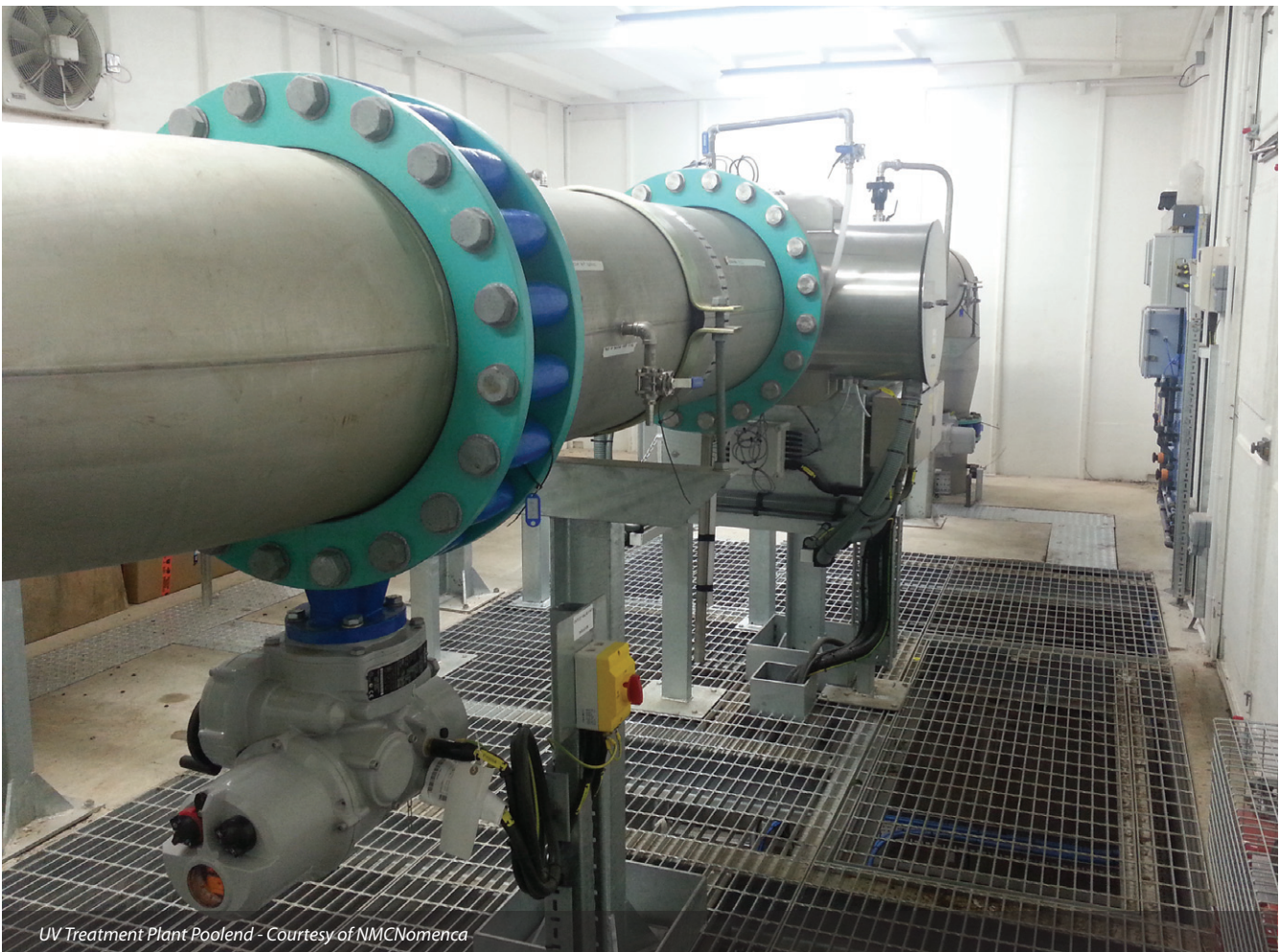


# Emergency UV Treatment Plant

## standardised modular approach to UV disinfection

Within the next Asset Management Programme (AMP6) Severn Trent Water are set to invest £27m in ultraviolet (UV) treatment. Design for Manufacture and Assembly (DfMA) is transforming the way that buildings and civil engineering infrastructure is being delivered. The approach is structured and simple, taking much of the work that is conventionally done on site using traditional trades in all sorts of conditions, into the factory with a high degree of quality control, more productivity, less waste and reduced safety risks.



UV Treatment Plant Poolend - Courtesy of NMCNomenca

### Introduction and project background

Severn Trent Water (STW) are investing time and effort in the study, research and development of a standardised modular approach to UV disinfection, the first iteration of this being the Emergency UV Plant. The team have developed a base line design and options selected dependant on the application to meet the requirements of the end user.

The original STW specification provided details of the minimum requirements. Using this as a baseline the team challenged the specification where they could demonstrate a significant commercial, technical, or safety improvement to the current design scope that stands scrutiny at peer review.

### Innovation

The group researched best practice from AMP5 and from other sectors to determine areas of focus/maximise benefit within

both Asset Creation and Service Delivery. This solution has been designed with collaboration from the supply chain and meets STW's business vision and captures innovation. The standardised modular approach will deliver the following benefits:

- Drive efficiency by providing repeatable solutions.
- Using manufacturing principles.
- Standard designs.
- Remove error in design.
- Reduce design time.
- Opportunity for bulk purchase.
- Standard operating methodology.
- Operator familiarity and confidence.
- Off-site construction in a safe and controlled environment.
- Minimal materials waste during construction.
- Snagging/factory acceptance tests prior to arrival on site.
- Standard and minimal spares holding.

- Reduction in associated health, safety and environmental risks.
- Carbon footprint monitoring.

To better enable the design to be presented to the STW One Supply Chain concept 3D drawings were developed along with the design specification using the concept of BIM. The solution was developed using a full 3D dynamic model and associated outputs with all the sub-contractors contributing. Using the software packages of AutoCAD and Revit Structures the 3D model has been developed and used within the design review process to ensure that all changes can be successfully incorporated and any pipe clashes detected. The reviews involved personnel from all disciplines including the design, construction and end user and ensured that risks were recognised and where possible designed out or clearly communicated.

The model will be used to provide full isometric drawings of pipework runs, along with automatic call offs for valves, pipe work sections, lengths, bends, and materials.

### Sustainability

The benefits of this study and research will significantly reduce risks in terms of installation, commissioning, and operation and generate a reduction in programme duration and ultimately reduce the cost of the project. The units are required to maintain compliance with the required Regulations for Water Production.

To fulfil the strict requirements the UV plant is specifically designed for treatment of drinking water. System validation is maintained at all time to comply with the Water Supply Regulations 2010 using one of the approved standards ie DVGW, USEPA standards.

The required validated dose is 40 mJ/cm<sup>2</sup> as MS2 RED. The system should be designed to operate at maximum site flow or the abstraction licence (whichever is greater) and when the UVT is 90%. The reactor should be validated to deliver a minimum 3 log cryptosporidium inactivation under the above conditions.

### Project management

The Specialist design team consisted of knowledgeable individuals from within Severn Trent including Asset Creation, Service Delivery and the design & build contractor. The research team recognised the importance of involving the supply chain from the outset. These included:

- Trojan UV - Design and delivery of the UV treatment plant.
- Boulting Group - Design and delivery of the control panels.

This was critical in ensuring that the design process was streamlined and where possible utilised existing equipment rather than bespoke products.

### Societal benefit

As part of Severn Trent Water's Groundwater Portfolio Risk Assessment, a need was identified to improve the resilience of some strategic groundwater sites.

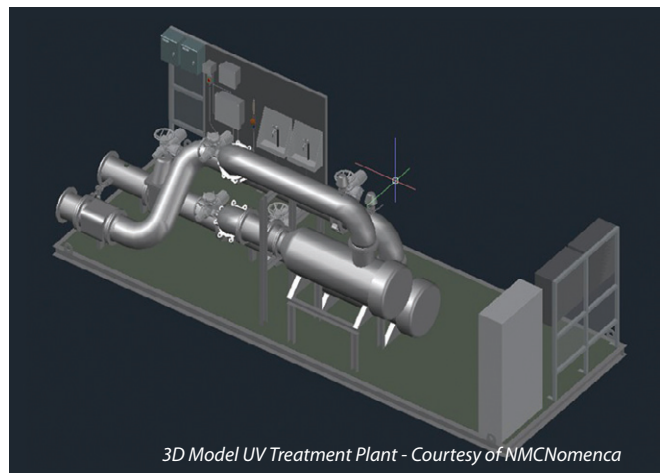
A detailed study and investigation of groundwater sites was carried out and from this several areas of work were identified. These areas of improvement included 'interim measures' and the installation of Emergency UV units.

To date NMCNomenca have installed six of these units. Following the success of this work the need for reactive deployable units was identified, to protect strategic water supplies.

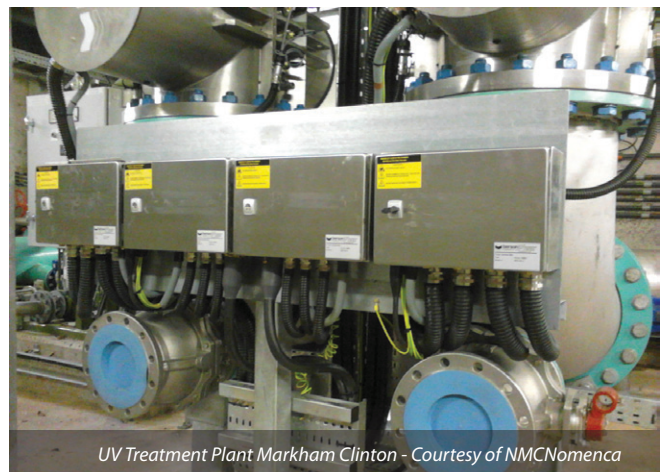
*The editor and publishers wish to thank NMCNomenca for preparing the above article, with assistance from Severn Trent Water, Trojan UV and Boulting Group.*



UV Treatment Plant Poolend - Courtesy of NMCNomenca



3D Model UV Treatment Plant - Courtesy of NMCNomenca



UV Treatment Plant Markham Clinton - Courtesy of NMCNomenca