

UK Flood Support Potable Water Supply



“With flooding in the UK becoming more and more commonplace and widespread, I believe that we must provide at risk communities with an alternative, cost effective, solution for the delivery of potable life-saving water”

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1.0 Executive Summary

1.1 Lack of water in a flood

Every year the UK is at risk of being held to ransom by extreme weather events; in particular, flooding. This phenomenon is increasingly commonplace. Each time extreme flooding occurs people and their homes and businesses suffer with the occupants often becoming stranded and cut off from essential services due to the destructive and invasive nature of the disaster. In these instances one essential element to human life, **water**, is provided via the distribution and allocation of bottled water. This often appears to be a *knee jerk* exercise, each and every time a destructive flood occurs.

1.2 Potable water – “Let us be better prepared”

With strategic forward planning people’s health can be proactively protected in a disaster by ensuring the provision to high risk communities of safe, clean drinking water at a minimum of cost, time and logistical risk. Mobile water purification devices (MWPD’s) can be set up at strategic geographic positions or stored for extended periods of time and rapidly deployed for the immediate supply of potable water. This eliminates large water storage requirements, emergency bottled water procurement and the logistical cost, time and risk required to distribute bowsers and bottled water.



2.0 UK Flooding and Water Aid Delivery

2.1 Case study – Gloucester 2007

Over the past number of years the flood risk in the UK caused by extreme weather events has significantly increased. After the widespread flooding and water shortages of 2007 the British Government commissioned a review of the emergency response and recovery operations for the incident. This review reported the largest loss of combined electricity, water and sewage services since World War II, with almost half a million people without mains water or electricity. ¹

At the time of a flood disaster a key element of the consequences is the breakdown of essential services to communities; electricity, drainage/sewage systems and last but certainly not least, the provision of quality, potable water. During the 2007 crisis, flooding of Severn Trent's Mythe River led directly to the loss of mains piped potable water supply to 350,000 consumers in the Gloucester area alone (a population nearly the equivalent in size to the entire City of Bristol) for up to 16 days. ² This led to a massive reactionary effort to provide sufficient sanitation water and potable water to the people affected.

A further report, re the 2007 extreme weather situation, stated that Severn Trent Water (STW) had to temporarily shut down its water treatment facility at Tewksbury forcing the suspension of piped potable water supplies to the immediate and surrounding community. In reaction to ensure provision of this essential resource, bottled water was procured from local manufacturers and supermarkets for distribution.

The demand averaged at **6 million litres per day**, which is equivalent to the total UK average daily consumption of bottled water. Over 1400 water bowsers were distributed to over 1100 locations with each bowser being refilled 3 times per day. ³ In total an approximate of 45 million litres of bottled water were distributed.

The logistical operation put in place was staggering; multiple distribution centres were set in place with distribution of bottles out into the community implemented by many from farmers to The Royal Marines. It should be noted that the road transport network was seriously compromised with many routes completely impassable and those that were open over congested with re-directed traffic making the delivery exercise extremely difficult and time consuming.



The cost to Severn Trent Water of the supply of bottled water was estimated at £25 million.
⁴ This equates to about £0.55 per litre, for comparison a Southern mains water provider will charge approximately £0.0034 per litre.⁵

To give a perspective of the scale of the bottled water distribution alone; 45 million litres of water equates to 45,000 tonnes, enough to fill a full blown, ocean going petrochemical tanker ship such as the [NCC Reem](#). It would take about 2200 articulated truck journeys to transport the bottles to the distribution centres where this would then be reloaded into smaller vehicles for forward distribution. The coordination required to deliver such vast quantities of water was immense involving massive input from the British Army, water suppliers, volunteers and UK businesses.

At the time of the 2007 floods, the Security and Emergency Measures Direction 1998 stipulates that water companies should provide a minimum of 10 litres of potable water per person per day when mains supplies fail. It was recommended by Water UK that this limit should be raised to 20 litres as it had become apparent that, after being used to an average of 138 litres per day, people found it very difficult to adapt in a short time. Severn Trent Water had been delivering up to 3 times the minimum on occasions but water stock levels were hard to maintain.⁶

Throughout the delivery of potable water to the community during the crisis it was clear that the differing qualities of water and how they should be used caused confusion to the public who were already suffering high levels of stress and anxiety at the situation. This led to voiced concern. There was a significantly high level of concern for the vulnerable, particularly the elderly. This confusion was administered through the differing signage and communications issued at the time. It has been advised to prepare in advance of another disaster for preventative solutions by the Health Protection Agency.⁷ and ⁸

To give a total scale of the risk and cost presented by flooding in the UK, there are 5.2 million properties at risk of flooding and an annual cost of £1.1 billion spent on flood damage.⁹



2.2 Conclusion

Water companies, government, local businesses, emergency services and bands of volunteers all pooled resources to provide the affected community with water. Together they just about got by, however it was shown that it was a struggle and that delivery of potable water could have been far more efficient with pre-emptive planning.

It was brought to light that other methods for the provision of water should be investigated to ease the bottled water procurement and distribution problems. Both Severn Trent Water ¹⁰ and Sir Michael Pitt ¹¹ highlighted this within their reports, notably the Pitt report suggesting portable, at source water purification equipment could be implemented with great effectiveness.

The Climate Change Risk Assessment (CCRA) suggests that the extreme weather events being witnessed in the UK are going to become more commonplace as the global weather structure alters on the trend that is now being experienced. ¹² Although climate change science is still in its infancy, only about 20 years old, it would be foolish to not heed the signs and prepare contingencies for these ever increasing events.

3.0 Alternative Potable Water Delivery

To override the knee jerk reaction of bottled water distribution in an extreme weather event emergency, a pre-emptive strategy can be designed and implemented using knowledge and experience gained from past events.

3.1 Flooding Event Facts

A number of facts which are freely available to work with in a flood scenario.

- Fresh (albeit, high turbidity) water is readily available in vast quantities
- Reactionary procurement of bottled water is incredibly timely and expensive
- Effective distribution of bottled water requires massive logistical effort with industrial scale stocking, multiple distribution centres, multi-scale transportation methods and vast manpower resources
- Effective distribution can be hampered with a disrupted road transport network
- Relative to bottled water, distribution of non-potable but clear water from reservoirs or preferably boreholes, is cheap and quick
- Education to the public for understanding which provided water is safe to drink and which is not can be difficult to convey. Providing sources of varying quality often creates extensive confusion.



3.2 Mobile Water Purification Devices Explained

A mobile water purification device (MWPD) is a self-contained water purification unit which is designed to process contaminated water directly at source into potable water. A MWPD can have integral pumping and power systems for full, standalone operation. MWPD's are scalable from simple, hand held, manually operated up to containerized municipal replacement supplies with multi-level water filtration systems.

Water is generally processed on demand removing the requirement of bulk potable water storage and the problems that this alone can present. Chlorine dosing can be included into the process minimising the likelihood of cross contamination post purification when delivering through pipes and carrying vessels, i.e.; water bottles and containers the public would use.

Different systems are available that can purify directly from a fresh water source through to sea water. Rule of thumb is the higher the salinity the more complex and expensive the equipment becomes.

Water purified can be of extremely high quality and comparable or exceeding the quality of a UK municipal mains supply and bottled water.

MWPD's can be simple to operate and maintain with minimal supervision and training required. Larger units can have remote monitoring integrated into the system so that a technical team can monitor water production and advise operatives of filter changes, equipment failure. Volumes of water delivered can be monitored to provide valuable data of the suitability of the units' position in the field.

MWPD's generally function using low cost, easily transportable consumable filter media which is simply replaced like for like, old for new. Filter media usually comes in a cartridge or bag form and is simply replaced when it has become saturated with contaminant. Swap out time is generally identified by a drop in water volume production or scheduled time.

3.3 MWPD Deployment for Water Aid

Employing a selection of scaled MWPD's can be used to great effect in a flooding disaster to ease or remove the logistical and procurement burden of bottled water. Devices can be stored in predetermined locations with appointed staff fully trained in advance to enable



rapid deployment of equipment. This would enable immediate delivery of the required volumes of potable water to communities at need.

MWPD`s can be positioned strategically alongside bowsers that are refilled with easily sourced untrusted water or adjacent to surface water sources to provide potable water on demand replacing the reliance on bottled water and ensuring that all water provided is of a potable standard.

For areas of known flood issues, boreholes can be drilled and capped strategically; upon emergency, MWPD`s can be sited alongside these providing a potable water answer with zero water logistics involved.

Man portable MWPD`s can be deployed with emergency rescue operations providing those stranded in remote locations with sufficient potable water without continued resupply of bottles.

Post disaster, equipment can then be returned to base, serviced and prepared for storage in preparation for re-deployment.

3.31 Man Portable Devices

Small, man portables MWPD`s, (generally the size of a suitcase) can be deployed into harder to reach and more remote locations where there are small numbers of people cut off from potable water. Able to be fitted in the back of any 4x4, rescue boat or lowered from an emergency helicopter, these devices are extremely versatile. They can be simple to operate and come equipped with an integral pump and rechargeable power packs. They can deliver sufficient potable water for up to 100 people per day. Water is purified on demand, (purify and use) negating the need for high capacity storage. Power supply can be from internal battery, car, mains, solar, generator.

The devices can be stored long term with minimal maintenance. Training can be delivered to appointed personnel in a similar manor to First Aid courses.

3.32 Trailer Mounted Devices

These are essentially high capacity versions of the man portable MWPD`s where purified water output is far higher, up to 100 times man portable device delivery. Devices are either trailer or skid mounted enabling ease of transportation by truck, boat, hovercraft or helicopter. Power is supplied by integral system or plugged into



adjacent source. Additionally these larger devices may be fitted with post purification chlorine dosing. This doses the potable water with chlorine to ensure against cross contamination in distribution and short term storage. Water is purified on demand, (purify and use) negating the need for high capacity storage.

Located strategically, trailer mounted devices will provide potable water from bowsers filled from reservoir or borehole sources for high numbers of people. In fact, if required water can be purified direct from flood water. Water can be delivered from one device to a number of tap stations easing water point congestion. Water distribution times would be significantly reduced as bottled water logistics are removed. Water quality confusion can be removed as “*all*” water would be “*Safe to Drink*”. The devices are simple to operate and performance can be monitored remotely by trained technicians where required and to better understand community water consumption. Consumable spares are lightweight and easy to ship in.

Equipment can be stored locally or even directly in strategic positions where flooding patterns are known. Equipment can be stored long term with minimal monitoring and service.

3.33 Containerised Devices

These are extremely high capacity water purification systems. The devices cater for high levels of water purification that can cope with desalination of high brackish water and above. Filtration systems use mechanical skimming and back wash systems creating a self-cleansing of filtration equipment, important when processing highly turbid water. Equipment is housed within standard 20’ or 40’ shipping containers to enable use of standard shipping methods, Lorries etc. Power is provided from mains, generators, or solar power packs.

In the same manner as trailered devices, located strategically, containerised devices will provide potable water from surface flood water, or trucked in “Do Not Drink” water for high numbers of people. Water can be delivered from one device to a number of tap stations easing water point congestion. Water can even be piped directly into municipal buildings such as hospitals to replace disrupted mains supply. Water distribution times would be significantly reduced as bottled water logistics are removed. Water quality confusion can be removed as “*all*” water would be “*Safe to Drink*”. The devices are simple to operate and performance can be monitored remotely by trained technicians where required and to better understand community water consumption.



4.0 Wananchi - Séon Water Purification Technology

Wananchi Séon water purification technology has been developed as a direct answer to these challenges. The Séon family of water purifiers have all been designed and constructed as robust, simple to use and maintain equipment, employing the highest quality engineering and components to ensure the reliable delivery of potable water whenever needed.

4.1 Séon UV – Man Portable Device.

The Séon UV unit is a mobile water purification system that enables filtration and disinfection of dirty water at its source. It is equipped with an innovative system of triple filters and an Ultra Violet disinfecting light to produce potable water from any dirty fresh water source.



The durable construction of Séon UV is critical when considering the operating environment. The unit can be used in the harshest conditions and will withstand the rigours of insensitive operation. All connections are industry standard push fit mechanisms which enable simple setup and operation.

Séon UV is a rugged unit housed in a [MIL-STD-810F, rotomoulded](#) case and has been designed for easy transport and minimal footprint occupation in a Disaster Relief vehicle. The NATO stock number of the housing means it can be incorporated quickly and easily into military logistical processes for transportation.

The integrated power cell will ensure continuous pump and UV lamp operation to deliver as much as 2000 litres of potable water. The re-charge system can be from a number of options including 12/24v DC in-vehicle sockets to 240/110v AC mains electricity. An optional solar charging solution is available.

One of Séon UV's greatest strengths is in its ease of operation. Almost no training is required as only two pipe connections are required and the filter replacement method has

been designed to be as simple as possible. This allows Séon UV to be used in areas of low expertise and no supervision is required.

Séon UV has been proven as a reliable and robust answer to delivering safe clean water.

4.2 Séon UVT – Trailer Based

Séon UVT is a mobile water purification system that produces high volumes of pure potable water from any fresh water source. It is big brother to the original Séon UV.



Séon UVT is equipped with multi-stage filtration, Ultra Violet disinfection, integral generator and twin self-priming pumps for full simple on site operation. Chlorine dosing is applied post filtration to ensure bacterially safe water after delivering into end user water vessels of potentially unknown sterility.

The durable construction ensures the unit can be used in the harshest conditions and will withstand the rigours of insensitive operation. All connections employ industry standard mechanisms which enable simple setup and operation.

Séon UVT is a rugged unit constructed with the industry standard Sankey Trailer for ease of mobility and ability to blend with internationally recognised supply systems.

4.3 Séon IFC

Séon IFC is a mobile water purification unit designed to produce very high volumes of potable water (up to 5.5m³ per hour) at source. It incorporates the core Séon values of functionality, quality and ruggedness with ease of use. With the capability to process up to 132 m³ in a 24 hour period, Séon IFC is built for the supply of drinking water in emergency response situations, large semi-permanent camps and displaced persons temporary villages and similar. The commercial applications are wide wherever there is a need for a supply of purified water on location.



Water is processed using a combination of flocculation, ultra-filtration (UF), carbon filtration and Reverse Osmosis (RO) at a rate of up to 91.6 litres per minute. The RO has 50% recovery rate. The unit is tested for build integrity and output water quality by an independent approved body pre-delivery. Touch screen displays ensure simple monitoring of equipment. An optional remote access control can be installed to allow technical support from a team in the UK wherever the Séon IFC may be located in the world.

Séon IFC (Intermodal Freight Container) is housed within a standard 20' × 8' (6.10 m × 2.44 m) shipping container. This method of equipment housing ensures that its contents are protected and that it will fit into almost any logistical supply chain in the world. Road, rail or sea, Séon IFC remains faithful to the Séon family mobility.

Séon IFC is equipped with insulated walls and ceiling combined with air conditioning and heating to maintain optimum internal working temperatures. Two 2m³ potable water storage tanks are included for standalone alongside or on top of the IFC container post water treatment.





Maintenance is minimal with RO and UF elements typically lasting between 5 and 7 years depending on water source quality. Séon IFC uses standard coagulants and sterilising additives. The majority of component cleaning is automated by the system. Electronic systems monitor for faults and when low on additives and inform the user with the simple Siemens display.

This is a complete water solution. Simply ship the unit to site, plug into a power supply then pump water from source. Wananchi will provide your organisation with full product training.

5.0 Conclusion

With the development of mobile water purification devices the issues of water aid delivery in a flood crisis can be suitably addressed in a pre-emptive manor ensuring simplified planning, greatly increased population confidence and hugely reduced overall costs.

It should be noted that MWPD's have the benefit of being a *Green* answer to bottled water. For a bottle of drinking water to reach the consumer there are a number of polluting and energy using stages to be passed. It is often suggested that a ¼ of a litre of oil and **3 litres of water is needed to make a full 1 litre bottle of water**. The energy and pollution required to ship bottled water is also quite significant. It has to travel from factory to distributor, distributor to retailer, then finally retailer to consumer, all at significant cost.

The answer for us here at Wananchi is simple and the technology and devises are available now. Where you are faced with finite resources, time and money we have a viable British designed, developed and built solution to your problem, **Séon**. You can purify all the water your populations require at source using one of our high volume Mobile Water Purification Devices (MWPDs) from our **Séon** range.

5.1 Key Points

- **Séon** devices are an immediate viable and sustainable water aid response in flood disasters
- Employing the re-usable Séon range of equipment further reduces costs
- Attractive ROI (Return on Investment) on procured Séon devices based on costs of procuring bottled water alone. Even more attractive with:
- Hugely reduced logistical time, effort, risk and cost
- High volume purified water to quality standard set by the **Water Supply (Water Quality) Regulations 2000** and the **DWD (Drinking Water Directive 1998)**
- **All water** purified by **Séon** and accessed by the community **is potable** reducing confusion and health risks
- Knee jerk, panic procurement of bottled water removed from disaster response equation, simplifying considerably the disaster response plans
- Strain on transport network during flood crisis significantly reduced
- Huge reassurance to the public of an “in place” solution which acknowledges and satisfies government recommendations, potentially managed only by UK councils
- A **Green**, environmentally friendly and responsible answer to bottled water

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“Water, water everywhere, nor any drop to drink” – Samuel Taylor Coleridge

*“Water, water everywhere, how much and where would you like it?” – Malcolm Padwick – MD
Wananchi Ltd UK*



5.2 Why use Wananchi as a collaborative partner?

[Wananchi Limited UK](#) design, develop, manufacture and integrate mobile and static water purification systems providing safe drinking water for humanitarian, military and expedition applications.

The team here at Wananchi whilst based in the United Kingdom, have lived and worked in parts of the world where a potable water supply is a critical need. We have solved on demand water needs for overland expeditions to complete community installations producing thousands of litres of clean, safe water for drinking. The result of this is our range of MWPDs (mobile water purification devices); [Séon Water Purification Technology](#).

All Wananchi water purification equipment is manufactured and tested in the UK using the highest quality components either Wananchi designed or from quality approved suppliers.

Wananchi can offer a dedicated technical and maintenance support package for your Séon equipment out in the field and in storage. This service can include remote monitoring and a 24 hour help line.

Wananchi also offer full product training packages to allocated 3rd party support personnel or agencies, or appointed staff within your own organisation.

Wananchi Limited is an [ISO9001 accredited](#) company with quality systems regularly audited by a leading international auditor. Wananchi has adopted quality methods employed in the aerospace manufacturing industry to ensure products delivered are of the highest integrity and traceability to ensure continued performance in the field.

Wananchi Limited believe that we have a responsibility to care for and protect the environment in which we operate. We are fully committed to improving environmental performance across all of our business activities and will encourage our business partners and members of the wider community to join us in this effort.



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