



Power & Water

Purification through Innovation



CASE STUDY

Aquaculture Wastewater Treatment



Sustainable wastewater treatment for safe discharge to sea

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Introduction

The balance between meeting the world's growing demand for seafood, and doing so sustainably presents many complex challenges. Health, safety and environmental considerations are paramount in the aquaculture industry, yet can present many potential hurdles to the fish farms. Aside from ensuring ultimate fish health, quality and well-being, success can be attributed to various other factors including:- reduced water intake, re-use, safe discharge of treated effluent and disposal of the sludge.

There is however, a growing need to address all external factors, including the potential for disease which could lead to outbreaks across farms and further, loss of livestock. Ensuring safe and effective measures are in place will continue to benefit aquatic health, farm sustainability and the economic feasibility of fish farming worldwide.

For the salmon industry and its supporting ecosystems, sea lice have become a real threat, impacting all stakeholders. The consequences of this are evidently demanding for the commercial salmon farming industry and surrounding environments. Salmon with sea lice can have associated health concerns and ultimately, increased risk of premature death.

Background

Ocean Matters, a cleanerfish rearing facility based in Anglesey, Wales, is the largest lumpfish producer in the UK, and the largest RAS lumpfish producer in the world, with the ability to produce up to 4 million deployable lumpfish annually. They believe that cleanerfish are part of a long-term health management solution and is the most sustainable and consumer-preferred option to combat sea lice.

Since its inception, Ocean Matters has led with focus and urgency to tackle this issue by producing quality lumpfish and ongoing development of effective co-habitation approaches. Their extensive knowledge of marine water RAS systems and water treatment will help mark a difference.

After discovering the potential at Ocean Matters, Mowi, the largest salmon producer in the world, purchased the cleanerfish facility; ensure that such challenges are handled in a proactive way. Mowi also have further plans to restore a redundant seabass hatchery in Penmon to grow Ballan Wrasse which will supply the majority of farmed Wrasse in the UK by 2021.



The Welsh Government have stated the importance of RAS systems as opposed to the traditional 'flow-through' processes, so that water demand is reduced. RAS set-ups will help to lower the demand for freshwater intake, but in turn, this creates a more concentrated waste stream within the facility, derived from the backwash filters. The growing concern for more robust RAS monitoring and treatment systems to ensure optimum fish health and environmental best practice, is paramount; clean water can be recycled for re-use within the tanks, and the waste can be handled separately for safe treatment prior to discharging and/ or disposal.

There is added pressure for certain producers who are based in sensitive areas where lakes, rivers, estuaries and seabeds are deemed to have 'high' or 'good status' under the Water Framework Directive (WFD) and may be of specific interest to local water bodies, environmental regulators and governed by legislation. The diverse landscapes and seascapes of Wales support a wonderfully rich and varied wildlife. The prime examples of habitats and species threatened in Europe are protected by 92 Special Areas of Conservation (SACs) and 20 Special Protection Areas (SPAs). These are collectively known as Natura 2000 – part of an EU-wide network of nearly 28,000 sites. Natura 2000 sites are adversely affected by a range of pressures and threats and require investment in active management and restoration if their protected habitats and species are to remain or reach favorable condition.

Solution

Ocean Matters discharge pipework sits in an Area of Outstanding Natural Beauty (AONB), SSSI and SAC status across the coastline, meaning that their treatment requirements must be met with accuracy and reliability. By using the latest treatment technology combined with extensive aquaculture, fish management and water treatment knowledge and experience, this surety in quality can be achieved and safeguarded.



As specialists in the latest generation of innovative water treatment technologies, Power & Water (P&W) were invited to meet representatives from the facility after sample testing at our in-house laboratory proved effective. The aim of which was to discuss the potential of using P&W's patented Soneco® treatment process, utilising sono-electrochemistry to reduce the elevated levels of contaminants produced from the facility Penmon, Anglesey.

The ability for P&W to meet the strict water quality consent for discharging directly into the Menai Strait has sparked the collaboration of two forward-thinking and environmentally driven companies. Together, with our shared expertise, we can ensure that wastewater treatment at the facility and beyond, will be handled, treated and disposed of in the most safe, sustainable and economic way.

Soneco® offers fish farmers a variety of solutions to provide reliability, cost savings and the potential for re-use and added value to their processes; One of which is for their wastewater treatment, greatly reducing disposal costs and negating any risks in discharging. This means that producers can meet tough legislative controls, helping the aquaculture industry meet the global demand for fish, whilst maintaining or even improving environmental status.

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Results

The results below have been achieved at the facility by installing the Soneco® Sono-SEC process for reducing TSS, Ammonia, Total Phosphorus and Ortho Phosphate.



Total Suspended Solids (TSS)
98.94% Removal

Total Phosphorus (Total P)
97.5% Removal

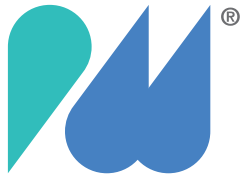
The removal rates have been validated and confirm that discharging into the Menai Strait is now achievable.

Conclusion

The performance of the Soneco® process for treating highly concentrated fish waste is extremely exciting and means that even the strict legislations for discharge into the Menai Strait, as well as other protected areas can be achieved – increasing the potential for more facilities across these areas with the knowledge this system could add another level of environmental protection for fish farmers.

“We pride ourselves as a sustainable and progressive company, operating on one of the UK’s best and most stunning coastlines. The P&W system allows us to operate with piece of mind in the knowledge that we are not harming the environment with our discharge. The process really does offer a fantastic piece of equipment, and the P&W team were incredible from start to finish.”

Ocean Matters



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“Power & Water is a UK water technology company specialising in sono-electro chemistry. We aim to deliver Circular Economy solutions allowing recovery of waste products, and to produce treated water for re-use or discharge back into the environment.”



The company knowledge and expertise are founded on more than 35 years' experience in the Water and Environmental industries. Our in-house expertise includes engineering, power electronics, software and MEICA.

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