

Project Case Study

Client:	Scottish Sea Farms Ltd
Project Value:	£50m
Dates:	November 2013 – December 2019

**Description:**

As the largest aquaculture production facility in the UK, delivering up to 1,560 tons of annual production, the 18,000m² facility contains a total of 12 departments; individual bio-secure units each with their own dedicated water treatment plant:

- 4 incubation departments
- 2 start-feeding departments, each with 8 circular tanks, 6m in diameter and 1.2m deep
- 2 on-growing departments, each with 8 circular tanks, 8m in diameter and 2.7m deep
- 2 pre-smolt departments, each with 8 circular tanks, 8.5m across and 3.3m deep
- 2 smolt departments, each with 8 circular tanks, 10.5m across and 3.9m deep

The tanks contain approx. 12,000m³ of water which is recirculated at least twice every hour using only 225m³/hr of “new” water. The recirculation water treatment plants allow the recycling and re-use of around 99% of the water used in the process. The level and method of treatment used varies by department, but includes:

- Mechanical filtration to remove particles/suspended solids
- Moving and/or fixed bed biological filtration, in which bacteria cultivated on bio-media are used to convert ammonia to nitrate, and trap small particles which pass the mechanical filter

- Ultra-violet light treatment to kill bacteria and disinfect
- Trickling filtration and vacuum degassing, in which the flow is trickled through porous media under a slight negative pressure, to remove nitrogen and carbon dioxide gas
- Oxygenation, using low pressure oxygen cones, to inject oxygen into the water

Young salmon spend 8-10 weeks in each department before moving into progressively larger tanks. The internal building finishes required to maintain biosecurity are to food-grade standards.

The site benefits from a private reservoir with a total capacity of 1,150 Mega litres. Effluent is treated by filtration to remove particles and suspended solids, and the sludge from the filters is thickened to 15% dry solids prior to disposal off site.

The facility uses highly efficient water source heat pumps for heating and cooling of the process water, and biomass boilers for heating the office and related accommodation. Other process plant and equipment installed includes lime and salt dosing, automated feeding systems, grading and vaccination equipment, and silage for mortalities.

Scope of Works:

Northern Light started work on the project in November 2013 delivering feasibility studies, budget costs and outline concept design.

Site selection commenced in January 2015, with over 44 potential locations evaluated and assessed. In January 2016, we issued the first tender documents, and in autumn 2016 we appointed the Aquaculture Designer/Contractor and Lead Consultant.

Demolition and enabling works on site commenced in January 2017, and the Main Contractor Robertson Construction started work in August 2017, with Billund Aquaculture of Denmark undertaking the process design and installation.

During the design and construction phases we have been responsible for project management, design liaison, site supervision and contract administration, including the procurement and management/co-ordination of 7 other specialist contractors appointed directly by the client.

We also secured R&D grant funding value at in excess of £1.2m for capital expenditure and R&D activities undertaken in relation to the project.

Key Points

This has been an interesting and at times challenging project, with an extremely tight programme. The design process remained in progress through the majority of the construction phase. Innovative design features have been incorporated throughout – this is the most technically complex and advanced aquaculture facility in the UK.

The first egg intake was in November 2018 and failure to commission each department on time ahead of production was not an option. The facility was completed in December 2019 with the first smolt output the same month.

The completed facility is significantly larger and more complex than was originally anticipated and there have been several significant design changes along the way. Other challenges have included working with contractors of different nationalities and cultures and incorporating highly specialist aquaculture plant and equipment within the facility.