

## DRD Water Service - Northern Ireland | Portglenone WwTW Improvements

### Bio-Bubble Advanced Aeration - Secondary Treatment

Portglenone is located on the banks of the River Bann and approximately 14 km west of Ballymena and 13 km north of Lough Neagh. The waste water treatment plant is located on the northern edge of the town, east of the River Bann. Both the Environment & Heritage Service (EHS) and Fisheries Conservancy Board (FCB) asked that consideration be given to reduce potential stress on the nearby River Clady which is a salmonid river. Previous to this, Water Service Northern Division had requested that the existing treatment works serving the villages and hamlets of Innisrush, Clady and Glenone be incorporated in the overall assessment.



BASIS OF DESIGN		
Population	3143	PE
DWF	1016	m <sup>3</sup> /d
Formula A Flow	5290	m <sup>3</sup> /d
Flows to Full Treatment (FFT)	2273	l/s
PROJECT VALUE		£2.1 M

The project required the design supply construction installation testing and commissioning of a new sewage treatment works at the existing Portglenone WwTW, including preliminary treatment and sludge thickening. The new works also receive sewage from Innisrush, Clady and Glenone.

**OTHER CONSIDERATIONS**

As Innisrush, Clady and Glenone are located on the opposite side of the River Bann, a pumping station will also be necessary to transfer the sewage to Portglenone WwTW. The old Glenone works was considered to be the best location for this purpose, receiving sewage from Glenone, Innisrush and Clady sewers then transferring to the Portglenone works via a rising main laid to the river bed.

Future development to the boundaries of the new Portglenone plant necessitated the requirement to designate the works an odour sensitive site. Consideration required the inclusion of odour assessment for the inlet works and waste sludge export in addition to the sludge thickening process. During construction of the new plant, effluent discharges must remain within the consent limits, therefore, the works were undertaken in a phase sequence utilising both old and new plant sections.

**SELECTED PROCESS ABILITIES**

The Bio-Bubble SBR Advanced Aeration system included a number of benefits fitting to the criteria for the new works which included:

**1) Balance Tanks with integrated Storm Tanks**

During storm periods, the Balance Tanks automatically adjusts to storm tank operation with retention of over 1 hour at the maximum design flow of 156 l/s. The preliminary works provide full duty standby 6 mm screening in addition to grit separation prior to discharge and storm retention.

After any storm period, the Balance Tank will retain excess storm waters for transfer to secondary treatment. The advantages of integrating the storm tanks besides removing separate tank construction includes, reduced capital costs and works footprint, negligible odour emissions (see odourless operation below), less mechanical & electrical equipment i.e. no return pumps or separate mixing equipment, instrumentation, valves or scrapers, in addition to lower operation, maintenance and power costs.

**2) Odourless Operation**

Bio-Bubble Advanced Aeration ensures both secondary treatment and sludge thickening operate with none to negligible odour emissions. Bio-Bubble Advanced Aeration holds several international designs; one being the Bio-Loop process where full advantage is taken of the odour reducing qualities from a highly treated sludge being intermittently recycled to the Balance Tanks.

Therefore, although being designated an odour sensitive site, odour control has been limited to the inlet works, the screenings building and to tanker movements for sludge export, allowing further reductions to be gained in capital and operational costs.

**3) Exceptionally Low Sludge Production**

Bio Bubble Advanced Aeration is noted for very low sludge waste production. A reduction in sludge waste production will reduce tanker movements, lessen overall energy input and will also benefit operational management of the plant. The addition of Bio-Bubble Sludge Thickening will add further reduction to the sludge waste by increasing to the dry solid content between 5-6%.

**PLANT PERFORMANCE**

The plant was put into service receiving flows to treatment and 90 days performance trials were successfully completed. The consent applied by the EHS for the new works at Portglenone is 30: 55 (BOD: TSS as mg/l). Samples were collected from auto-samplers and overall, the average sample analysis concluded the following final effluent results:

FINAL EFFLUENT RESULTS
3.4 mg/l BOD (ATU)
7.1 mg/l TSS
0.7 mg/l NH4+-N
22.6 mg/l TON

During the trials, the plant received flows from all incoming sewers and severe storms also prevailed during this period. Omitting for errors during analysis and one period where the inlet works was polluted with what was thought to be sheep-dip, 100 %ILE compliance was achieved throughout the trial period. Inclusion of errors and pollutant determined a 99 %ILE compliance achievement.

It should be noted that a BOD of 3.4 mg/l was achieved over 92 %ILE (± 0.9 13 mg/l) and 0.7 mg/l NH4+-N achieved over 97 %ILE (± 0.7 0.81 mg/l) throughout the trial period. The trials consolidated the success of Bio-Bubble Advanced Aeration to out-perform any other biological system.

**SLUDGE REDUCTION PERFORMANCE**

During the trial period 140 m3 of sludge had been removed from the new works. This is equivalent to 31 m3/ month sludge production from Bio-Bubble Advanced Aeration basins in comparison to an anticipated 330 m3/ month from basins of conventional systems.

Sludge thickening to 5 % dry solids will reduce sludge waste by over 80 %. Therefore, using a 14 m3 capacity tanker for sludge removal, a conventional plant would require 85 tanker movements compared to 17 by the Bio-Bubble, or 68 fewer tanker movements per year.

