

# Ballina Wastewater Treatment Plant

## upgrade of the existing treatment plant to increase treatment capacity

by Declan Ryan & Killian Foxe

**B**allina WwTP is located in the existing urban area of Ballina Town, roughly 100m from the border between County Tipperary and County Clare. The facility is an asset of Uisce Éireann (formerly Irish Water) and it is currently operated by Tipperary County Council (TCC) on behalf of Uisce Éireann under an existing Service Level Agreement. It serves both the Ballina and the Killaloe agglomerations and was officially opened in August 1996. It was initially designed to treat flows generated from population equivalent (PE) of 4,000.



Ballina WwTP - Courtesy of Ward & Burke

### Project need

The current population associated with the WwTP has been assessed at 5,400 PE, which is more than the current design capacity (4,000 PE). This population is estimated to increase to 8,000 PE in the +10 year design horizon and to 8,400 PE in the +25 year design horizon. Therefore, it was necessary to increase the treatment capacity of the WwTP to meet the current and increasing population within the agglomeration.

The WwTP discharged treated effluent via the primary discharge point to the Grange River. The discharge limits set out by the EPA Discharge Licence were not being met in relation to the BOD and ammonia limits.

The WwTP was an extended aeration activated sludge plant. There was no excess influent management system in place and as such, all flows entering the plant were passed forward to the process tanks. All flows entering the WwTP received the following levels of treatment:

- Preliminary treatment in the form of screening and grit removal.

- Secondary treatment in the form of two oxidation ditches and two final settlement tanks.
- Tertiary treatment in the form of a ferric dosing system to aid in phosphorus removal.

The waste sludge generated at the WwTP was stored and thickened on site within a picket fence thickener (PFT). As the existing dewatering facilities on site were no longer in operation, the waste sludge produced on site (approximately 90 tonnes/week) was pumped from the PFT to a tanker and removed from site.

### Scope of works

Ward & Burke was appointed by Uisce Éireann in December 2022 as the Main Contractor to upgrade the existing plant, providing design, civil engineering, plant operations and MEICA works for the contract.

The purpose of the contract was to upgrade the Ballina WwTP to provide sufficient treatment capacity for the target design horizon and to meet the required effluent discharge limits set out in the EPA Discharge Licence. The works included the design, supply, installation, testing, commissioning and handover of the upgraded





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Construction work underway at Ballina - Courtesy of Shay Murtagh Precast



New inlet works under construction - Courtesy of Ward & Burke



New final settlement tank under construction - Courtesy of Ward & Burke



New storm water tank under construction - Courtesy of Ward & Burke

plant. The existing WwTP remained operational during the construction works with minimum interruptions to the operation of the existing process stream.

The works included for the provision of operation and maintenance (O&M) of the existing Ballina WwTP during the design build and O&M of the upgraded plant for 365 days following commissioning. The scope of Ward & Burke’s design and build works included:

- Construction of a new below-ground forward feed pump station and stormwater overflow (SWO), to lift incoming wastewater to new inlet works and allow excess flows towards the new storm tank.
- Construction of a new above-ground inlet works structure comprising:
  - ✦ Duty/standby 6mm fine screens.
  - ✦ 19mm bypass screen.
  - ✦ Grit removal unit.
  - ✦ Grit classifier.
  - ✦ Screening handling unit.
  - ✦ Storm overflow and flow splitting chamber to split flows between the new and existing streams.
- Construction of a new below-ground stormwater storage tank along with associated pumps, meters and pipework.
- Decommissioning of the existing inlet screens and grit removal works.
- Construction of a new below ground circular aeration tank.
- Installation of new duty and stand-by blower units for the proposed diffuser aeration system.
- Construction of a new below ground final settlement tank.
- Construction of a new below-ground return activated sludge/waste activated sludge (RAS/WAS) pump sump and associated duty/standby pump set to facilitate sludge handling from the proposed new process stream.
- Construction of a new above ground picket fence thickener.
- Relocation of the existing outfall to a new treated effluent outfall to the Lough Derg which also incorporates the overflow from the new stormwater storage tank.
- Additional motor control centre (MCC) to facilitate the new stream.
- Ancillary works associated with the telemetry and control of the new process stream in combination with the existing infrastructure.
- SCADA upgrade resulting from additional works elements and decommissioned existing elements.
- Connection of the new stream to the existing infrastructure to facilitate testing and commissioning while the existing infrastructure remains live.
- Provision and installation of permanent and appropriate energy monitoring equipment to facilitate energy monitoring and verification of the design and operation of the works.

**Civil engineering works**

The major civil elements of work on the Ballina WwTP project and the outline construction methods are shown in the following table:

Element of Work	Construction Methodology
Storm tank	Below-ground precast concrete tank
Aeration tank	Below-ground precast concrete tank
FST	Below-ground precast concrete tank
PFT	Above-ground precast concrete tank
Forward feed PS	Below ground in situ caisson
RAS/WAS PS	Below ground precast chamber
Wash water PS	Below ground precast chamber
450mmØ outfall	Float & sink outfall pipe in pre-dredged trench

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## Ballina WwTP: Supply chain - key participants

**Civil/process design & project delivery:** Ward & Burke

**Employers representative:** RPS

**Resident engineer:** Nicolas O'Dwyer

**Precast tanks:** Shay Murtagh Precast

**Precast chambers:** Tracey Concrete

**Ductile iron pipe and fittings:** Fusion Pipeline Products

**Odour control:** John Cockerill Environmental

**Grit removal & storm/inlet screens:** Jacopa

**Aeration blowers:** Aerzen Machines

**Diffused aeration system:** SSI Aeration

**PVC pipe:** Total Pipeline Specialists (TPS)

**MCC:** Ward & Burke Construction Ltd

**Access covers:** EJ Ireland

**Pumps, mixers, fine bubble diffusers:** Sulzer Pumps Wastewater Ltd

**Flow meters:** Siemens

**Ultrasonic meters:** Pulsar Measurement

**Flow switches:** IFM Electronics

**Penstocks:** Talis

**Valves:** Valve & Actuator Solutions Ltd

**Actuators:** Auma Actuators

**Kiosks:** Gleeson Steel & Engineering

**FST scrapers & site-wide metalwork:** Keltec | D&E Welding

**FE service water boosters:** Campion Pumps

**Lifting equipment:** T Allen Engineering Services Ltd

### Process technologies

- 6mm MEVA step screens have been installed on this project which exclude the need for process washwater resulting in a carbon footprint saving.
- An air lift grit removal system has been employed which consists of stainless-steel coarse bubble diffuser system along with a stainless-steel grit lift pipes. This system ensures there is no moving parts submerged in the tank allowing all maintenance required to be carried out without the need to enter the tank.
- A fine bubble diffused aeration system has been supplied by SSI Aeration. The 9" fine bubble diffusers have got one of the best oxygen transfer efficiencies on the market.
- A final effluent washwater system has been designed to utilise the final effluent from the plant as wash water on inlet works launders, grit classifier and Washpactor. This means treated potable water is not required to be used, thus ensuring a better carbon footprint. The system consists of a buffer tank and a set of booster pumps and associated valving and pipework.

### Key challenges

Some of the key challenges on the Ballina WwTP project included:

- The project took place on a live treatment plant, which had to remain fully operational during construction.

- The works, including the construction of the outfall, took place in, and adjacent to, a major watercourse (the River Shannon) as well as the Grange river, with historical liability to flooding.
- The project scope required the construction of large underground structures up to 5m below ground in silts and gravels with potentially variable groundwater behaviour due to the presence of the Shannon, Mill and Grange Rivers.

### Conclusion/summary

The design and build project to upgrade the Ballina WwTP is due to be commissioned in October 2024; after 550 days. The upgrade will bring benefits to Killaloe and Ballina including ending the discharge of poorly treated effluent, improving water quality in the receiving waters, and enhancing local amenities and a platform for social and economic development.

The project also accounted for forecast future population growth of the surrounding areas and ensuring compliance with the Urban Wastewater Treatment Directive and EPA Wastewater Discharge Licencing.

*The editor and publishers would like to thank Declan Ryan, Site Agent, and Killian Foxe, Mechanical Design Engineer, both with Ward & Burke Construction Ltd, for providing the above article for publication.*



*New outfall under construction - Courtesy of Ward & Burke*





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