

# Antrim Wastewater Project

**£23.5m investment by NI Water delivers effective wastewater treatment for the Antrim catchment up to a 2035 project horizon**

by  
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**T**he Borough of Antrim is situated at the heart of Northern Ireland, on the north east shores of Lough Neagh. After a 33-month construction period, commencing in August 2007, the area is now experiencing the benefits of a major investment undertaken by Northern Ireland Water to improve the existing wastewater network and treatment facilities within the extensive catchment. The project included for the construction of a new wastewater treatment works, two terminal wastewater pumping stations and the laying of approximately 18km of associated pipelines within an environmentally and historically sensitive area.



*Aerial of Antrim WwTW*

*Courtesy of Northern Ireland Water*

## **Need for the project**

The existing treatment works at Antrim was constructed in the early 1970s to serve a population equivalent of 30,000 from the town. The rationalisation of outlying catchments in the mid '90s led to the works receiving additional flow from several neighbouring settlements, including Templepatrick, Crumlin, Dunadry, Killead, Aldergrove and Belfast International Airport.

Limited improvements over the years had resulted in a significantly overloaded works, which regularly failed to meet consent requirements, particularly with respect to ammonia. With virtually no automatic control and some major items of plant having been in operation for twice their expected design life, the existing works was reliant on excessively high levels of operational and maintenance input to perform to its current level. These problems were compounded by

the existence of an unsatisfactory sewerage network which permitted substantial loss of flow and loading (sewage) at a large number of pumping stations and Combined Storm Overflows (CSOs).

## **Project Development**

Having identified a need for capital investment, Northern Ireland Water (NI Water) undertook an appraisal study to identify and evaluate appropriate options to deliver effective wastewater treatment and outfall arrangements for the Antrim catchment up to a 2035 project horizon. The appraisal included for the completion of a Flow and Composition Study (FACS) at the WwTW and a comprehensive catchment-wide Drainage Area Study (DAS) to investigate the scale of the network problems. The output of these studies was to provide NI Water with an integrated wastewater treatment and network solution for the complete catchment area.



Antrim WwTW - sludge holding tanks

Courtesy of Northern Ireland Water

On completion of the various studies, the area-wide recommendations for the works and networks were prioritised by NI Water. The business case recommended that the construction of a number of top priority essential network improvements be included with the treatment works contract and procured as one design and build contract. On approval, tender documentation was issued to a restricted list of five tenderers, and after the appointment of a Preferred Bidder and period of design development, the contract was awarded in July 2007 to Joint Venture Contractors, BSG Civil Engineering, Williams Industrial Services and Veolia Water Solutions under the NEC 3, Option A (Priced Contract with Activity Schedule) Form of Contract.

The design and build contract was project managed by Northern Ireland Water's Engineering Procurement Section, working in partnership with technical consultants McAdam Design.

### Project Overview

The Antrim Wastewater Project is centred on the construction of a modern wastewater treatment works and regional sludge dewatering facility to replace the existing outdated and overloaded Antrim WwTW (on the same site) and provide a high quality effluent to meet the consent requirements for discharge to nearby Lough Neagh. Other major infrastructure improvements and rationalisation works were undertaken within Antrim town centre and at the nearby area of Randalstown.

The new treatment works was designed to serve a combined residential and industrial population equivalent of 87,000 and incorporates a sludge handling and dewatering facility for the region. The wastewater treatment process consists of an inlet screw pumping station, preliminary treatment (screening, grit removal, storm separation and storm storage), primary treatment utilising refurbished existing tanks and a new secondary treatment stage in the form of an activated sludge plant with final settlement. This provides carbonaceous removal together with nitrification /de-

nitrification and chemically assisted co-precipitation, to aid nutrient removal (1 'P' 15 Total 'N' annual average), to achieve the required final effluent consent.

The new sludge treatment facility, which in addition to site generated sludge, also caters for imported sludge from neighbouring treatment facilities and septic tanks from the surrounding rural area. The facility comprises separate sludge thickening and dewatering stages to produce a minimum of 27% dry solids content sludge for transport off site to an incinerator in Belfast.

At the neighbouring catchment of Randalstown, network rationalisation work included the construction of a new terminal pumping station to enable the decommissioning of the town's existing treatment facility and a 6km long transfer main was laid to transfer flows from the 8,000 population equivalent catchment to the new Antrim WwTW for treatment. Upsizing of existing sewerage network within the town centre (upstream of the new pumping station) was undertaken to alleviate the area's historical flooding problem and the opportunity was taken to replace existing watermains, ahead of a planned environmental improvement scheme for the town centre and conservation area.

The existing pumping station at Massereene, on the edge of Antrim town centre, is a strategically important cog in the operation of the Antrim sewerage network, being responsible for passing forward approximately 40,000 population equivalent flow to the treatment works. A new pumping station, incorporating 650m<sup>3</sup> of storage capacity and screening was constructed to replace the existing inadequate station and provide protection to the sensitive River Sixmilewater running adjacent to the site. Upsizing of the existing sewerage network upstream of the new pumping station allowed for the closure of two troublesome combined sewer overflows (which had been previously responsible for pollution incidents) and the alleviation of an area predicted to flood within the project horizon.



Antrim WwTW - four final tanks

Courtesy of Northern Ireland Water

## Challenges

One of the biggest challenges facing the project management team was the delivery of the project within the timeframe for compliance imposed by the Northern Ireland Environment Agency, and the need to programme the network improvements to be complete prior to full process commissioning and proving of the new treatment works. This was made more difficult by the necessity for significant design development of the network solutions post contract award, which when fully developed, required third party approval from landowners, public bodies and other interested groups before construction could be commenced.

## Consultations

Considerable time and effort was afforded to public relations associated with the project. Information days and other such communication events were convened to inform local residents, businesses and elected representatives as to the scope of the project, its importance and progress. The project management team also worked closely with council representatives, local groups and DRD Roads Service in the programming of works and extreme measures implemented where necessary to facilitate road users and the local community. For example, in Randalstown, which lies on a strategically important route to Belfast, due to lack of a suitable alternative route pipe laying works were undertaken at night, with roadways reinstated prior to the morning peak traffic flow.

At the Antrim WwTW, odour modelling and monitoring was a requirement of the planning process for the new treatment works and pre-tender stage consultations on the impact assessment and mitigation measures proved a significant hurdle to overcome during project development. Initial concerns were expressed by Antrim Council as to the proximity of the WwTW to a recently completed

business park as well as the municipal golf course, which flanked three sides of the works perimeter. After much discussion on the definition of 'legitimate sensitive receptors', separate biofilter odour control plant complete with activated carbon polishing was provided at the works inlet and sludge treatment areas to achieve 1.5 odour units at the boundary.

## Archaeology

The Borough of Antrim is an area steeped in history with the main town of Antrim having been a settlement for some 1,500 years. As such, the town of Antrim lies within an archaeologically sensitive landscape with numerous identified archaeological sites, buried remains, historic buildings and industrial and military remains.

Under current legislation, the built heritage of the province is protected by the Northern Ireland Environment Agency, who has responsibility for excavation licensing, survey recording and artefact reporting. The Antrim Wastewater Project included for the laying of extensive lengths of new pipeline through the historic gardens of Shane's Castle Demesne and Antrim Castle Gardens. The strict archaeological monitoring of these sections of work posed significant problems to the delivery team with regard to route selection and programme. With archaeological heritage being an irreplaceable and diminishing resource, preservation in situ is the preferred option. At particularly sensitive locations, sympathetic pipeline construction techniques were enforced with directional drilling and tunnelling methods being implemented.

Artefacts uncovered during the project included ceramics, glass and animal bones ranging from the 17th to early 20th centuries and a number of underground timber structures and dry stone drainage dating back to the 1600s.



Antrim WwTW - storm tank

Courtesy of Northern Ireland Water



One of the two primary tanks at Antrim WwTW

Courtesy of Northern Ireland Water

**Present Situation**

With construction and commissioning of Antrim WwTW and essential network upgrades complete, the new treatment facility is currently (as of June 2010) undergoing acceptance testing prior to handover to NI Water Operations in late summer 2010. Early indications are that the new plant is consistently producing a high quality effluent in accordance

with the consent requirements for discharge to Lough Neagh.

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