

£42m North Coast Wastewater Scheme

most complex wastewater & bathing waters scheme in N Ireland

Water Service's North Coast Wastewater Treatment scheme is the most complex EU Urban Wastewater Treatment and EU Bathing Waters Directives compliance scheme ever undertaken in Northern Ireland. Representing an investment of £42 million, the scheme forms one of Water Service's largest ever single capital investment projects. Involving the construction of a new wastewater treatment works, on a greenfield site, construction of eight new and six existing refurbished pumping stations, 24kms of pipelines and gravity sewers, four minor and one main sea outfall.



Map shows the complex wastewater & bathing waters scheme in Northern Ireland

courtesy Water Service, Northern Ireland

The scheme entails the construction of a new wastewater treatment works, which is being built on a greenfield site at Craigtown More, between Portrush and Portstewart. Eight new pumping stations are being constructed and six refurbished around the Coleraine, Portrush Portstewart areas, a new long sea outfall at Rinagree and 24kms of pipelines are also included.

New wastewater treatment works

The need for a completely new wastewater treatment works was recognised due to a combination of rising European standards and the growing population and industry in the area. The requirements of the sewerage system are varied and fluctuate seasonally due to one of the main industries - tourism.

Within the design of the wastewater treatment works, additional measures have had to be taken to ensure effective removal of possible fats, oils and greases that could enter the sewerage system from the higher accommodation occupancy and increased restaurant business in the area during peak tourist seasons. As a

result, systems such as a dedicated F.O.G removal system and a fully automated hot and cold wash system for the inlet screens have been incorporated into the design.

The various pieces of package plant that are being purchased from leading suppliers are state of the art, e.g. polypropylene lamellas from Paques BV, a fully automated hot and cold wash system for inlet screens from Adams Hydraulics/KG Norman and a first for Biwater Graham JV – four SCUDA (Self Contained Underwater Dipping Apparatus) units from E.M.I Co Ltd., which are being used in preference to the more traditional static scum box units.

The fourteen pumping stations contained within the scheme have been designed along the cascade system, so that the smallest pumping stations are pumped into main/terminal pumping stations and then finally to the main treatment works. Every pumping station, with the exception of two, has been designed to not only pump but also to contain stormwater in extreme conditions.

Four of the new pumping stations are situated in prominent locations along the coast or within town centre locations. For this reason, Water Service and the project management and design and build teams have developed aesthetically pleasing solutions which integrate effortlessly with their surroundings.

At Dhu Varren Pumping Station, situated on the West Strand at Portrush, the North Coast team, in consultation with Coleraine Borough Council, designed the building to incorporate much-needed public conveniences, baby and water sports changing facilities.

In the town centre, Causeway Street Pumping Station will be largely buried and creatively landscaped to provide a visually attractive area, while along the coast, the new pumping station at Lansdowne is to include a public viewing platform. The building at Lansdowne will be level with the roadside and from its rooftop it will offer passers-by a large open space from which to take in the breathtaking coastal views.

Four of the pumping stations, namely Dhu Varren, Causeway Street, Riversdale and Articlave have been constructed with shafts. The construction of these shafts is by the Caisson method which is carried out as follows:

The Caisson method is used where the ground is incapable of standing unsupported (in the cases of Causeway and Dhu Varren, the ground comprised loose sand and peat). A steel cutting toe is firstly laid out and set to position and level. These toe segments are bolted together and the first precast concrete segmental ring bolted on top. Polystyrene is then placed around the first ring and cutting toe and a reinforced concrete launch collar concreted into place.

This method of construction means there is no need for expensive and high risk temporary piling or shuttering work, as the shaft walls become the final tank walls. Cement grout is finally pumped into the void at the back of the segments, displacing the Bentonite. The segment/rings then interact with the ground pressure in an arching effect (similar to an arch bridge) thus allowing the ground pressure to be transferred to the 50N strength precast concrete segments and high yield hoop bolts.

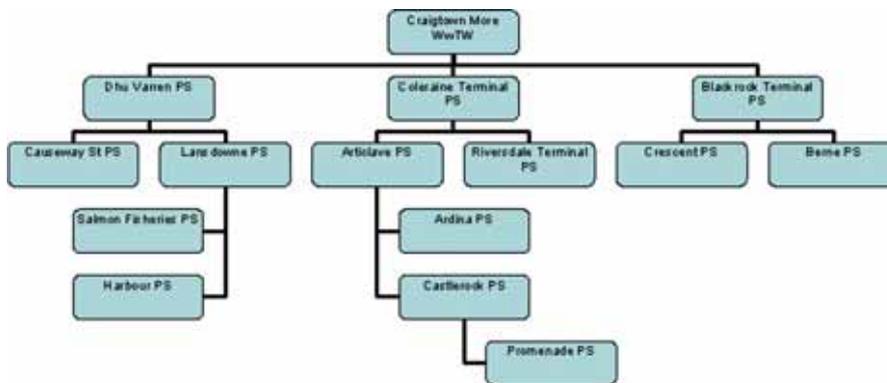
This method permits deep construction depths with relatively thin wall thicknesses.

The scheme also involves the refurbishment and replacement of pipes within the Portrush town centre. Slip-lining techniques have been utilised where possible so as to minimise disruption to business and traffic, and reduce the environmental impact. Where it has not been possible to slip-line pipelines, other methods such as micro-tunnelling and pipe-jacking etc have been used.

The North Coast Scheme, after treatment, discharges to the sea through an outfall at Rinagree Point. The laying of this 1,200m long pipe is being carried out by a specialist subcontractor and involves the use of two offshore rigs. The route of the outfall was carefully chosen following consultation with the Environmental Heritage Service and other statutory bodies to ensure that it did not impact on any significant, rare or inter-tidal plant, marine life and animal communities.

Sympathetic construction

The programme of works for the North Coast Wastewater Treatment scheme has been carefully planned to minimise disruption during the busy tourist season. Construction restrictions have been put in place to ensure that no major works are ongoing



Pumping Stations in the North Coast scheme

courtesy Water Service, Northern Ireland

The polystyrene prevents the concrete from bonding to the first ring and cutting toe. This polystyrene creates a void which allows further rings to be assembled and pushed down into position through the collar. The concrete collar is used to keep the shaft plumb and in the correct position and also serves as a base onto which large hydraulic jacks are bolted. These hydraulic jacks are then used to push the precast concrete segments into the ground as the shaft is excavated out from the inside. Consecutive rings are constructed at the surface and pushed into the ground as the excavation progresses at the same rate.

Bentonite slurry is continually pumped into the void around the shaft. This Bentonite allows the shaft to keep moving and prevents surrounding ground from closing in and jamming the shaft.

The shaft is sunk approximately 2m into a medium/hard clay layer where it then becomes possible to remove the cutting toe. The fact that the shaft has penetrated the clay means that ground water above cannot penetrate through the clay layer, thus leaving a dry shaft ready for construction of the base.

on the roads while high volumes of holiday makers are visiting Portrush, or while important events are being held. Weekly meetings take place with DRD Roads Service to facilitate programming and co-ordination with other utility work in the area and all pipe laying activities are programmed in accordance with Roads Service requirements.

In a bid to keep key stakeholders informed, the project team also meets each month with staff and elected representatives from Coleraine Borough Council, Coleraine and Portrush Chambers of Commerce and Portrush Community Association.

Overall, the majority of construction works will be completed by May 2007, when the new WwTW will be operational. Final connections, testing and reinstatement works will be ongoing on the scheme until December 2007. ■

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