

# Loch Ryan Wastewater Treatment Project

Scottish Water's £28m investment to deliver a modern, reliable and durable wastewater solution for Stranraer and the surrounding villages

Situated in the rural landscape of Dumfries and Galloway, Stranraer is the region's second largest town and is the administrative centre for West Galloway (Wigtownshire). It sits on the bank of Loch Ryan, a sea loch bristling with Scotland's only natural oyster bed, and has a population of 13,000. Major employers are the Caledonian Cheese Company and the Port of Stranraer, which provides an important ferry service to Ireland. Stranraer and the surrounding villages of Leswalt, Kirkcolm and Cairnryan comprise the last major settlement in Scotland without a modern wastewater provision with secondary treatment. Scottish Water's complex Loch Ryan Wastewater Treatment Project will address this, by rationalising the existing assets down to one major wastewater treatment works (WwTW) with a long sea outfall.



The new Loch Ryan WwTW under construction (August 2011)

Courtesy of Scottish Water

## The current system

The current wastewater system for Stranraer and the surrounding villages is outdated and in need of replacement.

- **At Stranraer:** Situated at Port Rodie on the harbour front, the WwTW for Stranraer is a primary treatment facility with underground settlement tanks and no sludge treatment facilities. Sludge is collected daily tankered to a sludge treatment centre at Dumfries, creating an occasional odour issue.
- **At Leswalt:** Waste from the village of Leswalt is treated at a small works with a stone trickle filter and discharges to the Sole Burn.
- **At Kirkcolm & Cairnryan:** Small septic tanks are in operation for the villages of Kirkcolm & Cairnryan, which discharge to Loch Ryan.

## Complex civil engineering challenge

The brief for Scottish Water was to devise a cost-effective, environmentally sound and future-proof wastewater provision for

Stranraer, Leswalt, Cairnryan and Kirkcolm that will comply with future EU wastewater directives, and significantly improve the water quality and shellfish environment in Loch Ryan.

After years of studies and surveys to assess the best option for an extremely difficult civil engineering challenge, Scottish Water opted to:

- Construct a single wastewater treatment plant performing both primary and secondary treatment to treat flows from Stranraer, Leswalt and Kirkcolm.
- Construct a new long outfall pipe to transfer final effluent to the Irish Sea, removing completely the permanent discharge to Loch Ryan.
- Construct a new pumping station at Port Rodie.
- Re-use the existing underground settlement tanks at Port Rodie WwTW for storm storage within the network, providing relief in times of exceptionally heavy rainfall. Exceptional storm flows will be directed along the current outfall pipe so there is minimal impact on the waters of



Loch Ryan WwTW at the early construction stage (May 2011)  
Courtesy of Scottish Water



View across Loch Ryan from the site of the new WwTW at Smithy Hill  
Courtesy of Scottish Water

Loch Ryan, and once any heavy rainfall abates stored storm waters will be able to be redirected to the new WwTW from the new pumping station.

- Demolish the existing WwTW at Port Rodie and the current facilities at Cairnryan, Leswalt and Kirkcolm.

Routing all the flows to one single WwTW offers the best whole life cost, as well as satisfying the environmental, planning, third party and operational issues for the Loch Ryan cluster of schemes. Effluent from the surrounding communities will receive a greater level of treatment than is currently provided, and by removing the permanent discharge into Loch Ryan, the legal requirements of the UWwTD and Shellfish Directive will be satisfied.

#### Locations

**Wastewater Treatment Works:** The new facility will be situated in a greenfield site at Smithy Hill in the hills to the south west of Stranraer, which was chosen for its elevation and relative remoteness. The construction will have a minimal effect on local residents.

**Outfall:** A number of outfall locations for the new treatment works were considered along the coast, both north and south of the harbour town of Portpatrick. Some were more suited to specific potential treatment works locations.

The chosen location will discharge the treated effluent to the North Channel of the Irish Sea. The main considerations were:

- Geology of the coastline.
- Accessibility for construction plant and equipment.
- Sufficient space for construction at the landward side of the construction.
- Availability of a fresh water supply to assist in drilling operations.
- Length of outfall pipeline to ensure 1:50 dilution in the sea water.
- The potential environmental impacts from the outfall construction operation.
- Cost for construction.



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*Working in partnership with  
Scottish Water  
throughout Scotland*



Work is underway at the Cairnryan PS, which will take flows to the new shared WWTW at the Stena Terminal - Courtesy of Scottish Water

### Treatment for Cairnryan

One of the local villages, Cairnryan, was originally part of the overall Loch Ryan scheme. However, with the addition of the new Stena ferry terminal at Cairnryan, a deal was reached to treat effluent from the village at a new WwTW at the terminal, north of the village. This partnership with Stena has many advantages:

- An 8km pumped wastewater main is no longer required to Stranraer.
- A shorter 2km main to the new WwTW will reduce construction costs and total life cost of the project.
- The new wastewater main will direct flows from Cairnryan into the terminal, and the existing small WwTW at Cairnryan will be retired.
- The new WwTW offers tertiary treatment, so the treated effluent will have minimal effect on water quality in Loch Ryan.
- The Stena Terminal WwTW will be adopted by Scottish Water once complete.

### Planning permission & Port Rodie PS design approval

The planning applications and negotiations were led by the Scottish Water Planning Team and extensive discussions and negotiations were held with Dumfries and Galloway Council on the design of the pumping station.

A design had to be harmonious with the overall look of the buildings in Stranraer and fit with the aspirations of the Stranraer Waterfront Urban Design Strategy and Masterplan.

The proposed waterfront location for the Port Rodie Pumping Station was the source of some local opposition even though it is adjacent to the site of the current WwTW. Since such a large amount of existing underground infrastructure is to be re-used, Scottish Water had to successfully demonstrate that there was no other practical location for the pumping station other than Port Rodie.

### Marine surveys determine seabed conditions for outfall

A 120-tonne barge hired from Structural Soils Ltd was stationed at Broadsea Bay near Larbrax throughout September 2010 to perform extensive geotechnical sea bed surveys.

The data collected during the investigation helped the team determine the shape, composition and density of the sea bed to confirm the best route for the long sea outfall, and ascertain the best method of installing the long outfall pipe - directional drilling through the rock, or dredging the sea bed and laying the pipe on the sea bed. Part of the work involved drilling through the sand and gravel deposits to locate the rock bed which will help the team make an informed decision on the best method.

### Extensive consultation & community work

Ongoing consultation with the relevant statutory bodies (such as Dumfries and Galloway Council and Scottish Natural Heritage), non-statutory bodies (such as Royal Society for the Protection of



Port Rodie Pumping Station under construction (August 2011)

Courtesy of Scottish Water

Birds and National Trust for Scotland) and the local community has been a key part of the project from the very beginning.

A community forum was established by Scottish Water, which meets regularly to update various community groups (resident associations, Chamber of Commerce, police, Harbour Masters, community councils etc) on the progress of the project. The community forum acts as a one-stop-shop for discussion of any concerns or queries directly on a face-to-face basis with the project team.

This direct approach has paid dividends. Community organisations and individuals have commented positively on the open and transparent way Scottish Water is consulting and sharing information with them, and this approach is set to continue through the construction and commissioning phases of the project.

#### Contract awarded & programme of work

In September 2010 following a competitive tender process, LeslieMWH Joint Venture were appointed Design & Construction contractor for the works, with responsibility for developing the outline design and delivery of the completed scheme, with the on-site construction works and full commissioning forecast for completion in the autumn of 2012.

**Port Rodie Pumping Station:** Work started on site in January 2011 at Port Rodie, located adjacent to the existing primary treatment works which serves Stranraer. The new pumping station comprises a 22m diameter, 12.5m deep shaft containing both the wet well / dry well and valve chamber. It is constructed on partly reclaimed land, with previous uses which include the site of the town's gas works and the local abattoir.

For good measure, a historic harbour wall which ran through the centre line of the shaft some 5m below ground level required to



Port Rodie PS under construction - Courtesy of Scottish Water

be logged by a specialist archaeological team prior to its removal.

A close and cooperative working relationship was maintained with the local SEPA representatives, which ensured the successful excavation and decontamination of the waste material from the gas works was achieved.

The Motor Control Centre, ventilation and standby emergency generation equipment will be housed in a building above, which has been designed to be sympathetic to the Dumfries & Galloway Council Stranraer Waterfront development masterplan.

By August 2011, the main structure of the pumping station had been completed to ground level, with internal works, deep inter-connecting pipework and building erection works following on. The completed pumping station will be capable of transferring 155l/s under normal conditions, and up to 208l/s under storm conditions, over a new 4.3km, 500mm diameter pipeline to the new treatment works at Smithy Hill.

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Work begins on the start of the long outfall pipe at High Challoch Road  
Courtesy of Scottish Water

**Cairnryan PS:** The new satellite pumping station at Cairnryan together with 1km of 125mm diameter pipeline was constructed over a four month period to July 2011 and awaits final connection and commissioning once the new Stena Ferry Terminal treatment works is ready to receive incoming flows. The work to convert the existing Leswalt & Kirkcolm primary treatment works into pumping stations, together with 6km of transfer pipelines is due to start late 2011. As all the satellite pumping stations currently operate as live primary treatment processes, the construction and commissioning of these works require to be carefully phased, with close cooperation of Scottish Water operations teams to ensure existing treatment is maintained through the conversion.

**The new WwTW:** Construction of the new treatment works at Smithy Hill commenced in April 2011. Access to this site necessitated crossing the high pressure, Scotland-Northern Ireland gas interconnector main pipeline, which required extensive protection works prior to the mobilisation of any heavy plant. With bulk earthworks for the Primary Settlement, Bio-filter and Humus

tanks substantially complete by August 2011, work will progress on the deep inter-connecting pipework and the tank and chamber construction throughout the autumn and winter of 2011-12, together with the 8km, 560mm diameter outfall to the Irish Sea.

By the time the main civils construction works are completed in early spring 2012, the M&E installation will be well underway, with commissioning and biological process establishment due to commence in mid-summer. The LeslieMWH Joint Venture have programmed full commissioning and handover of the completed Loch Ryan Strategic Solution Project together with the decommissioning of the original assets for late autumn 2012.

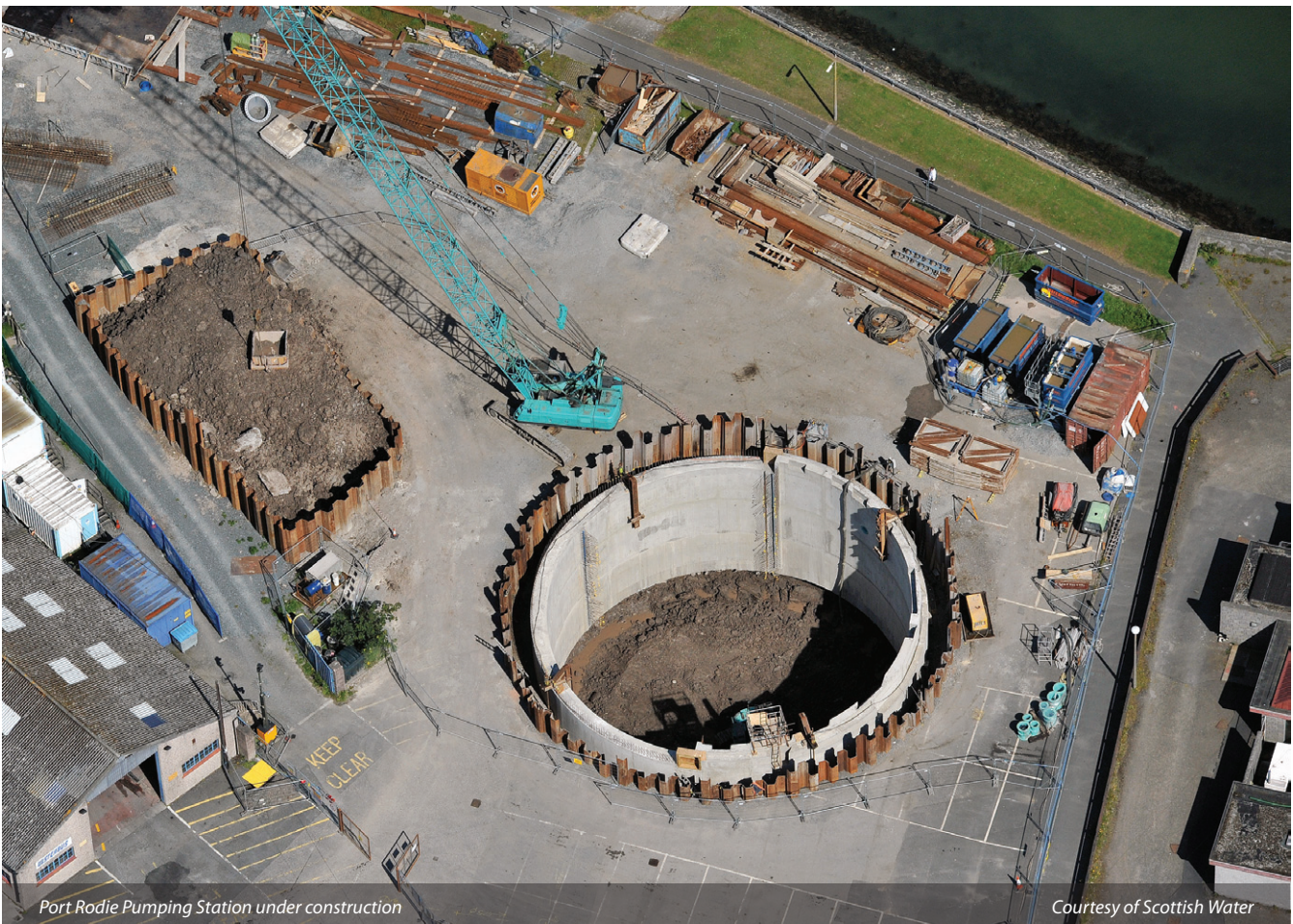
**Simpler solution will increase efficiency**

Once construction is complete, Scottish Water Operations will operate and maintain the treatment works and all pumping stations. Ultimately, the client for the project team is the Asset and Investment Management team within Scottish Water, and once delivered, the day-to-day running will be managed by Scottish Water's local operations team. Visits to the satellite pumping stations will be relatively infrequent (perhaps once a week) but there will be daily attendance at the main treatment works site. The day-to-day operational activities at the main site are not likely to cause disturbance to residents due to its location, making this new solution preferable to the current provision on many levels.

**Flagship Project**

The Loch Ryan Wastewater Treatment Scheme is one of Scottish Water's flagship projects for the 2010-2015 investment period. In the months to come Scottish Water and LeslieMWH JV will deliver a modern, reliable and durable wastewater solution for Stranraer and the surrounding villages.

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Port Rodie Pumping Station under construction

Courtesy of Scottish Water