

# Development Centres

## Scotland's first dedicated water and wastewater technology testing facilities

by Heather Campbell

Scottish Water Horizons Ltd has created Scotland's first ever full-scale test facilities for testing water and wastewater technologies in the Highlands and Central Belt. Initially funded by a grant from the Scottish Government, two Development Centres have been created to enable companies to test prototype equipment and technology on an operational scale prior to full scale marketing to the water industry. It is anticipated that Scotland's rural communities will benefit from work carried out at the Test Centres.



Gorthleck Development Centre, near Inverness - Courtesy of Scottish Water Horizons

### Background

In 2012 the Scottish Government set out its ambition for Scotland to become the world's first Hydro Nation by making the most of the country's natural water resources to support sustainable economic growth. Research by enterprise agencies identified a number of barriers to innovation and growth within the water sector. The Government announced the creation of a Hydro Nation Water Innovation Service (HNWIS) to facilitate interfaces between the academic, utility, business and community sectors.

In anticipation of emerging needs, Scottish Water Horizons Ltd (a subsidiary of the publicly owned water utility), created Scotland's first full-scale water and wastewater test facilities to enable the test, development and commercialisation of new technologies to progress at pace. Test Centre users work on water and wastewater technologies under live conditions in a safe and dedicated environment to enhance the commercial attractiveness of their products without risk to Scotland's water resources.

The test facilities also enable further real-time hands-on collaboration between businesses, academia and the public sector to encourage new opportunities and knowledge sharing.

### Gorthleck Development Centre - Water

To support innovation in water treatment, Scottish Water Horizons transformed a recently 'mained out' treatment works at Gorthleck,

near Inverness, into a state-of-the-art test facility. Commissioned in January 2015 the centre benefits from highly variable raw water quality that is typical of mainly rural raw water sources in Scotland and other parts of the world, giving innovators the opportunity to perform testing, proving and development under live conditions without any risk of causing detriment to drinking water quality or public health.

**The Transformation:** The transformation of Gorthleck from a 90 module membrane plant into a modern and dynamic test facility demanded vision and significant modification. The project was divided into two key phases:

- 1: Modifications to the existing plant area,
- 2: Upgrades to the welfare facilities.

**Gorthleck Phase 1:** This involved retro-fitting the existing plant to operate below 100m<sup>3</sup>/day and the removal of redundant membrane stacks. One membrane stack remains comprising 10 (No.) membrane modules for use in future trials and to support training.

Plant automation was introduced, one benefit of which is to enable monitoring of the raw water inlet flow. The installation of new pipework has enabled four testing areas with individual feeds of raw water to be created; these include the option of obtaining raw water that as passed through permeate filters.



Each test area was fitted out with a variety of power feeds and monitoring to provide a flexible testing environment. The water from the testing is then safely returned to the environment. Where any chemicals are added the discharge is sent to an isolated chemical waste tank for specialist disposal off site.

**Gorthleck Phase 2:** This phase focused on refurbishing and upgrading the welfare facilities on site. A training room and on-site laboratory space was created.

More recently a roof mounted solar PV scheme has been installed which reduces the site's carbon emissions and partially offsets its electricity consumption.

### Bo'ness Development Centre - Wastewater

At Bo'ness near Falkirk, a wastewater Development Centre has been created next to Scottish Water's existing wastewater treatment works. The most significant benefit of the facility being situated on the site of a live treatment works is that testing can be conducted safely on effluent streams under real conditions. The facility carries a Waste Management Licence which enables users to import waste streams from alternative sites for test purposes, providing a flexible and dynamic test, development and proving environment.

The site also benefits from a number of existing assets that Scottish Water Horizons are considering for future for development in line with industry needs; for example 2 (No.) 320m<sup>3</sup> digesters.

Following extensive refurbishment and commissioning, the Bo'ness Development Centre now comprises three main areas:

**Bo'ness Testing Hall:** The Bo'ness testing hall was created from the redundant sludge press building and now provides three testing areas, each benefitting from individual feeds of wastewater from different stages in the treatment process – namely post screening, post primary treatment and final effluent.

Each testing area has a variety of power connections and monitoring equipment. Benefitting from it's location within a live site, all discharges are returned to the normal wastewater treatment process.



Bo'ness Development Centre, near Falkirk

**Bo'ness Screen Testing Area:** This is a dedicated area that has been created to allow testing of new wastewater screening technologies at the inlet of the treatment works. This was achieved by installing a penstock at the inlet to create the ability to divert flows and return them prior to hitting standard screens at the treatment works.

**Welfare Building and Laboratory:** A dedicated on-site laboratory space was created and is available for users in addition to refurbished welfare accommodation, mess facilities and security provision. The potential reuse of the anaerobic digesters is currently being evaluated.

### Growing interest

Interest in the Development Centres continues to grow, particularly in relation to nutrient recovery and potable water treatment.

In conjunction with HNWIS, Scottish Water Horizons are engaging with a number of businesses and academic institutions to facilitate access to and use of these sites. Large-scale testing has been carried out to deliver industrially relevant results for various technologies.

To date these include:

- Testing and validation of design assumptions of an existing self-activating energy dissipation system to enable a company to extend their product range.
- Trialing of a vacuum distillation unit to produce distilled clean, drinking water from raw water to support rural communities.
- Testing of a new membrane technology to optimise performance of water treatment works.

Bringing such exciting technology and products to market not only contributes to Scotland's sustainable and economic growth, it also unlocks the potential to increase international trade and collaboration, ultimately supporting Scotland's ambition of becoming the world's first Hydro Nation.

*The editor and publishers would like to thank Heather Campbell, Project Manager with Scottish Water Horizons Ltd for providing the above article for publication.*



Testing area within Gorthleck Development Centre

### Scottish Water

A publicly owned company, answerable to the Scottish Parliament and the people of Scotland, Scottish Water provides 1.37 billion litres of drinking water and treats 921 million litres of wastewater every day.

### Scottish Water Horizons Ltd

Scottish Water Horizons, a subsidiary of the public utility, supports the development of Scotland's sustainable economy by maximising the potential of Scottish Water's assets. The company operates and manages both Development Centres to provide users with safe, unique and flexible access to industry leading test facilities.

### The Hydro Nation Water Innovation Service

The Hydro Nation Water Innovation Service (HNWIS), established by the Scottish Government through Scottish Enterprise and Highlands and Islands Enterprise, identifies innovative companies, particularly

SMEs, and supports them along the innovation path from concept to commercialisation.

The HNWIS partnership, comprising, of AECOM, WRc and UK Water Ltd are delivering a three-year programme to support the Scottish Government's Hydro Nation ambitions.

Access to the Development Centres is coordinated with HNWIS which offers guidance on funding options and specialist support.

### Access to the Development Centres

For further information contact HNWIS on 0300 013 2381, email hnwis@scotnet.co.uk or visit [www.hnwis.scot](http://www.hnwis.scot)

For technical enquiries contact Heather Campbell, Scottish Water Horizons, by emailing [swdevelopmentcentres@scottishwater.co.uk](mailto:swdevelopmentcentres@scottishwater.co.uk)