

Kyle Regional Water Supply

£5.5 million regional water supply project

One of the main challenges faced by Scottish Water engineers in providing upgraded water and waste water services for the Kyle area was the avoidance of damage to the local environment. The tourist hotspot of Skye and Lochalsh, one of the country's most picturesque areas has a highly sensitive environment and contains a site of Special Scientific Interest and a Special Area of Conservation. East of Kyle, on the north shore of Loch Duich, is Eilean Donan Castle, which features on more Scottish calendars than just about any other building. Further east still is Glen Shiel, home to some of the best walks and many of the most attractive mountains in the Western Highlands. Hardly surprising, therefore, that the £5.5million Kyle Regional Water Supply project was the subject of extensive discussion and several years in the making. By working closely with a range of organisations, Scottish Water has managed to improve the quality and quantity of drinking water without threat of damage to the surroundings.



Replacement of shinty pitch after pipe had been installed

courtesy Scottish Water

Quality water

Communities around Lochalsh - Dornie, Inverinate, Letterfearn, Ratagan, Sallachy and Shielbridge -formerly received their drinking water supplies from individual treatment works which struggled to cope with numerous peaty burns.

Now they are connected to better quality water from Kyle WTW which was already supplying Balmacara, Duirinish, Kyleakin, Kyle of Lochalsh and Plockton, brought to public attention in the 1990s by the filming of the popular television series Hamish Macbeth, which starred Robert Carlyle.

Area Delivery Manager Ian Watt said: "Our customers are beginning to see the benefits of the massive investment Scottish Water is making to the Kyle infrastructure, This is essential upgrading which is resulting in the modernisation of the local supply network and bringing the networks up to maximum performance. This project is

important for local residents and for tourism. By ensuring that remote communities have access to reliable supplies of water, we're sending a very positive message."

In total, £30 million - or £2,471 per person is expected to be invested in Skye & Lochalsh by 2010, part of Scottish Water's £200 million 'Vision for the Highlands'. Kyle WTW uses water from Loch Achaidh na h-Inich, which is situated in the Site of Special Scientific Interest and Special Area of Conservation.

A small weir at the loch will enhance the supply but during severe drought conditions - estimated to be one in 30 years - water will be taken to the works through 12 kilometres of pipelines from an alternative source above Lochalsh Dam. This will prevent damage to Loch Achaidh na h-Inich, which is home to a rare species of dragonfly and a historic crannog, Dun Fiadhairt, built in around the third century.

Scheme initiated

The scheme was initiated in 1997 and proposed the integration of a number of small under-performing WTWs serving communities in the area. This required the expansion of the local mains network and the creation of a single WTW at Kyle with the water supplied from Loch Achaidh na h-Inich

Although the WTW was successfully commissioned in 2001, commissioning of the full regional scheme was not possible due to restrictions on abstraction imposed by the existing Water Order and difficulties in assessing Water Resources.

The water treatment plant at Kyle of Lochalsh is a PCI (now ITT Industries) nanofiltration (NF) spiral membrane plant. The plant utilises four parallel pressure media filters to pretreat the water before it is pumped through the NF modules. The media filters have their own automated back-washing system that is fed from a 25 m³ media-filtered water storage tank.

The filters are set to each backwash once every 36 hours that the plant operates, on a staggered basis, meaning that one media filter is backwashed approximately every nine hours of plant operation.

Each filter backwashes for five minutes followed by a three-minute flush period. Dirty backwash water and filter flush water drain to two 25m³ attenuation tanks which drain to the burn at a controlled rate of about 0.5 to 1.0 l/s.

The spiral membranes are fed media filtered water via surge vessels. The feed flow is split between two parallel membrane trains designated T100 and T200, each containing 64 membrane elements, housed in 16 vessels per train. The membrane trains T100 and T200 are designed to operate independently so either one or two membrane trains can be brought into service, depending on the demand for permeate.

Each membrane train is supplied with three feed pumps (2 x duty and 1x standby) which pump water across the feed side of the membranes. This water then recirculates back to the inlet of the feed pumps with a proportion of the recirculated water bled to waste as reject.

The reject flow from the membranes is required in order to prevent the concentration of solids and organic matter building up in the recirculating water to a point where membrane performance is impaired. The reject flow passes to a 70m³ chemical waste tank from where it is released to the burn.

Permeate from the two parallel NF membrane trains is combined and flows to a limestone contact tank (LCT) where it is chlorinated, remineralised and pH adjusted. The water flows from the LCT under gravity to a two-compartment 2000m³ service reservoir. Final water to supply flows through a supply flow meter and into distribution.

Downstream of the supply flow meter, service water is pumped to a service water storage tank and to a small reservoir that supplies Achnandarrach. Not all the water that is pumped to the plant leaves in the form of supply water. Some water is used for washing the media filters, some leaves as membrane reject and some is used for membrane flushing and cleaning. Chloramination will also be added to the process during the coming year.

Plans

Scottish Water's plans for Skye and Lochalsh are the culmination of a massive programme of improvements providing quality drinking water, a cleaner environment and more capacity to enable development.

Already, real benefits are being delivered for communities and customers with the commissioning of the Kyle scheme, which is

providing upgraded drinking water for approximately 1,300 customers in Lochalsh.

Other major Scottish Water upgrade projects recently completed in the area include Earlish (£1.5m drinking water) and Portree (£4.3m waste water (both on the Isle of Skye and on nearby Raasay (£1.5 million drinking water).

Major projects under way to upgrade drinking water include: Torrin (£906,000); Bracadale (£670,000); Raasay (£360,000); Strollamus (£829,000); Elgol (£667,000); Drumfearn (£938,000); Tarskavaig (£1.1million); Kilmaluag (£538,000); Carbost (£437,000); Kyle (£5.5 million); Braes (£1.1 million).

Some £150,000 is to be invested in waste water improvements at Broadford on Skye and Kyle is to get a £1.1 million waste water upgrade along with a £2.5 million water mains upgrade linking Borve and Edinbane.

Major drinking water upgrade projects due to start in the coming months include: Arnsdale (£1.5 million); Waterstein (£429,000); Osedale to Dunvegan (£860,000).

Waste water upgrades include Glenelg (£300,000) and Dornie (£200,000).

Note: *The Editor & Publishers wish to thank Scottish Water for preparing the above article, and thank Ian Watt, Senior Project Manager Scottish Water and Andy Barnett, Senior Project Manager for the Kyle Project who provided the technical information.* ■

The Fyne process

A complete water treatment package

THE solution for rural water supplies with difficult water sources.




Fyne's features and benefits:

- Tubular nanofiltration membranes, providing a filtration barrier without coagulants.
- Addresses variable, poor quality surface water sources, including disinfection by-product precursors and all pathogens.
- Sludge free process, with the potential to be fully automated - excellent environmental credentials.
- Standardised package plants with minimal footprints, costs and lead times.
- Cost effective - over 60 operational plants.
- Reliable - over 14 years in operation.

PCI Membranes,
ITT Water & Wastewater,
Jays Close, Viabes Estate,
Basingstoke,
Hampshire, RG22 4BA
Tel: +44 (0)1256 303 800
Fax: +44 (0)1256 303 801
Email: pcimembranes@itt.com
Web: www.pcimembranes.com




Engineered for life