Billingham Sewage Transfer Scheme

efficient environmental improvement for newts & humans

by

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Northumbrian Water Limited (NWL) currently discharge fully treated and disinfected effluent to Cowbridge Beck from their 43,000 population equivalent Billingham Sewage Treatment Works (STW) on Teesside. The beck flows into Greatham Creek and Seal Sands, an internationally important bird reserve and SSSI, which the Environment Agency (EA) wish to protect by tightening nutrient discharge consents. NWL are, therefore, investing £8m in an environmentally sensitive scheme to transfer these treated flows direct to the North Sea via their existing coastal infrastructure at Seaton Carew, some 7km away, by the Dec 2008 deadline.

Existing discharge to Cowbridge Beck from Billingham STW *photo courtesy Entec UK*

Options

Although Billingham STW provides full treatment using activated sludge and ultraviolet disinfection to foul and storm flows, the effluent flow of 385 l/sec causes critically high nutrient levels in the downstream creek, causing the EA to impose 10:1mg/l limits on ammonia: phosphorus discharge levels respectively by December 2008. NWL engaged *Entec UK* in 2006 to assess the consequent treatment requirements and options.

The treatment options had to be designed robustly to comply with EA chemical dosing and minimum aeration temperature restrictions as well as the NH3 and P removal. Although tertiary biological aerated filters (BAFs) and biofilm media options were considered, The extra energy and sludge treatment costs were significant. The optimum treatment solution was, therefore, developed using tertiary sand filters with additional upstream anoxic zones and chemical dosing, and drum thickening for the increased sludge make.

Alternative transfer options were considered, but EA would only relax the discharge consent if the new discharge point was beyond the Tees Estuary ie - direct to the North Sea.

A dedicated outfall would be prohibitively expensive, and potential use of existing industrial outfalls was fraught with operational uncertainties.

However, NWL had an existing outfall and pumping station at Seaton Carew, only 4km from the Tees Estuary, already serving Hartlepool's 130,000 pe STW 2km inland at Brenda Road, Seaton Carew. The hydraulic implications and connecting route optimisation were, therefore, investigated for the potential use of this facility.

Careful hydraulic design enabled 630mm ID polyethylene pumping main to be reduced to 3.0km of the total 7km transfer distance, thus

minimising pumping head and long term energy use. The last 0.7km was also able to make use of the existing gravity tunnel, leaving 3.3km of concrete gravity main to construct at various diameters and depths.

Interim and full reports in May/June 2006 confirmed transfer costs at least £2.5M cheaper than treatment, with operating costs an order of magnitude less, leading NWL to concentrate resources on the treatment option as early as possible.

Transfer route

The selected route threads between the nature reserves and SSSIs of the Tees Estuary, and the suburbs of Hartlepool, through predominantly agricultural and industrial land.

The first 500m however passes through Faith Woods, planted approximately 12 years ago as part of Cowpen Bewley Woodland Park, country park managed by Stockton BC. Despite this length, careful routing through an existing glade in the woods minimised the required tree felling area to 400m^2.

Approximately 2.5km of predominantly arable fields are then crossed by the MDPE pumping main in minimal depth trench, with single span coated steel pipe bridges required to cross two watercourses. The summit discharge point is reached within the grounds of the Corus Hartlepool pipe mill, from where the concrete gravity main takes flows to the existing gravity pipe feeding treated effluent to Seaton Carew Headworks. Flows are then pumped out to sea through NWL's longest (4km) sea outfall.

The length through Corus land is routed along derelict railway sidings, where filling of an old railway cutting allows simultaneous disposal of spoil and raised pipe levels to reduce downstream excavation costs.

The main Sunderland - Stockton railway is crossed at 5m depth to avoid track settlement, requiring an oversized tunnel construction between shafts. The downstream end of the main skirts the Tofts Farm industrial estate and grazing land, with only three road crossings on the entire 6.3km construction route.

The newts

As part of the route investigations, habitat surveys were undertaken for various protected species that might be affected by transfer construction activities, and are legally entitled to appropriate protection. This included a survey of 27 ponds within 500m of the route, of which 9 were found to contain great crested newts (GCNs), triggering the need for a GCN licence from DEFRA before construction could commence.

This licence requires extensive mitigation, including prior planning approvals and the demonstrable clearing of GCNs from the site before construction commences. This in turn required nearly 6km of newt barriers to be installed during the GCN pond season (April/May 2007) including newt gates and grids at vehicle crossing points, with pitfall traps at regular intervals. Daily checking of these traps and rescuing of trapped GCNs would then follow, with the affected site (comprising over a third of the entire route) only being declared available for construction once GCNs stop falling into the traps

Specialist contractors were sought for this advance work using competitive tenders for NWL's first dedicated newt barrier contract, while planning and licence applications were pursued to suit, in liaison with Natural England, the EA and DEFRA.

The programme

The construction programme was dominated by the December 2008 completion deadline and GCN mitigation measures. Newt fence construction during the April/May 2007 pond season, followed by GCN trapping and surveying, effectively delayed a site start until late summer 2007, leaving c.15 months to complete construction and commissioning of the scheme. This enabled NWL to procure the main construction by tendering to framework contractors in summer 2007, with the following constraints built into the contract:-

* work in GCN zones to be completed by April 2008 to enable GCN barriers removal during 2008 pond season;
* tunnelled rail crossing booked with Network Rail for a weekend in Spring 2008;
* trench crossing of the working Corus rail siding booked for a pipe mill shut down in Autumn 2007.

To date, the new fence contract has been awarded, planning permissions obtained and detailed design is in full swing towards a site start before Autumn 2007. ■

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