£35m Holyhead Wastewater Treatment Scheme

full SBR treatment & environmental benefits to area

by
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A £35 million scheme to provide full biological treatment for Holyhead and the surrounding villages of Trearddur Bay, Four Mile Bridge, Valley and Caergeiliog is underway after suffering major delays owing to planning issues. The schemes constraints also include the Ynys Cybi candidate Special Area of Conservation (cSAC), Beddmanarch Bay and Inland Sea Site of Special Scientific Interest (SSSI), the Holy Island Heritage Coast and the EU Designated Bathing Beaches at Trearddur Bay and Porth Dafarch. Holy Island is also an area of outstanding natural beauty (AONB). To overcome these challenges a collaborative partnering team has been set up to deliver the scheme within the regulatory timescale.

Holyhead WwTW Scheme - surrounded by nature courtesy Welsh Water

Background

The scheme is required to deliver environmental benefits , under the Urban Wastewater Treatment (England and Wales) Regulations 1994. These benefits include provision of a wastewater treatment plant to serve the areas of Holyhead, Trearddur Bay, Four Mile Bridge, Valley and Caergeiliog, and remove unsatisfactory CSO discharges within these catchments by not later than 31 December 2005. The proposed scheme will also improve the sewerage network and ensure that discharges do not adversely impact on bathing and other amenity waters in the area.

The sewerage system at Holyhead presently discharges untreated sewage through a series of short sea outfalls at Morawelon, Turkey Shore, Waterside, Coastguard/Porth Sach and Porth Y Felin (to the West of the harbour breakwater). Sewage from Caergeiliog, Valley Four Mile Bridge and Trearddur Bay is pumped to a screening and disinfection plant to the south of Trearddur Bay before discharge through a short sea outfall. The sewerage networks also included unsatisfactory combined sewer overflows (CSOs) and sewage flooding.

The scheme has overcome significant problems associated with obtaining planning approval. Public concern was received to the original scheme proposals. Owing to the public feeling against the proposals Dwr Cymru Welsh Water decided to carry out a review of possible alternative plans.

The review process identified 11 possible alternatives, these were then reduced to four possible alternative sites. These in turn were further reviewed and one possible site was identified. The consultation process involved local county and community councillors, in addition to a liaison group, all of whom were engaged as key stakeholders in this process. The liaison group was formed from a cross section of local people.

Planning approval for the wastewater treatment works was given at the end of July 2003. However, owing to the delay incurred during this planning process, the project team had been redeployed to other schemes within DCWW's AMP 3 capital programme to mitigate costs.

Reforming the team took place in August and September 2003, their focus was to complete the engineering detail to enable a target cost to be set, prepare and submit planning applications for the sewerage catchment pumping stations and complete the Engineering Solution report for submission to the Environment Agency Wales.

The scheme then received full approval from DCWW for construction to proceed and work commenced on site on the 5th April at the Wastewater Treatment Works site and also at several outlying pumping stations.

Engineering detail

During the feasibility stage, several treatment process options were considered for the WwTW. The process selected was a Sequential Batch Reactor plant (SBR). This process is different from conventional wastewater treatment processes in that the whole treatment process takes place in a single tank rather than separate primary, secondary and final settlement tanks. The treatment process cycle lasts approximately four hours and involves an aeration stage (2 hours), followed by a settlement stage (1 hour) which is in turn followed by a decant stage (1 hour).

The proposed scheme will transfer flows from the outlying villages and Trearddur Bay via nine pumping stations, to the new wastewater treatment works (WwTW) located on the outskirts of Holyhead between the Penrhos Industrial Estate and Anglesey Aluminium Smelting Plant.

The WwTW site is bounded by mature conifers to the South and East and by the main Holyhead to London railway line and A55 to the West. Flows from Holyhead town network will also be transferred, via seven pumping stations, to the same WwTW.

This new WwTW will serve an existing population of 23,000 and provide full biological treatment. The treated effluent will be discharged through a land based outfall pipeline (5.7km length) and terminate with a new marine outfall located to the Northwest of Holyhead Town, some 890m offshore.

The construction works requires new pumping stations and stormwater storage facilities at Porth Y Felin, Hibernia Row, Coastguard, Waterside, Turkey Shore, Morawelon, Penrhos Beach, Caergeiliog Valley, Gorad, Four Mile Bridge, Porth Gwr Mawr and Trearddur Bay. In addition to the outfall pipeline mentioned above, the scheme includes 13,5km of new rising mains and 3km of gravity sewers to convey flows to the WwTW for treatment.. Pipe diameters will range from 80mm up to 1800mm.

Construction challenges

To meet regulatory timescales the scheme must be operational by December 2005. The construction programme duration is 14 months, with another 4 month commissioning period. With a start date of 5th April 2004, this still leaves 2 months float prior to the regulatory deadline. *Galliford Try* is the main contractor; under a collaborative partnership approach.

The other team members are

EC Harris, Meica, ITT Sanitaire, Mulcair, William Hughes, Daniel, Land & Marine JV, EJ Kelly and Rock Blasting Engineering.

In addition to the construction partners the scheme's operational partners are *United Utilities Operational Services, Site Electrical, Petrofac and Dwr Cymru Welsh Water (DCWW),* all of which have been active participants in the design process.

Having carried out hydrographic survey work and dispersion modelling, an outfall discharge point has been agreed with the Environment Agency Wales (EAW). Whilst this point is an excellent one, ensuring the dilution criteria are met, it poses both environmental and engineering challenges..

To reach the discharge point the outfall pipes must cross Ynys Cybi candidate Special Area Conservation (cSAC). To achieve approval to work with the cSAC a construction method was chosen that would have the minimum disturbance on the cSAC. However, this also has significant engineering difficulties to overcome owing to the geological complexity of the area which includes geological faulting within a very hard rock strata. To overcome the difficulties in reaching the discharge point some 890m offshore a 'float and sink' method was also selected for the remainder of the marine outfall.

As part of the peer review and value engineering activities employed throughout the scheme it has been agreed to rationalise on storage tank design and construction method. This resulted in a specialist sub-contractor *E J Kelly,* to sink several concrete shafts, employing either jacking or free fall construction methods,

The presence of rock at many of these shaft locations would mean either removing the rock by percussive methods or blasting of the rock. After consulting with Environmental bodies and the local Environment Health Officer, it was agreed that the least disruptive method would be by using controlled blasting techniques.

Environmental issues
As well as the environmental challenges mentioned above, a range of further measures have been taken to minimise the impact of the scheme on the surrounding area environment and ecology, these include the following.

Protected species have been encountered on the scheme, including Great Crested Newts, Badgers and Water Voles. After consultation with ecology specialists and Countryside Council for Wales (CCW), the relevant licenses have been obtained and are being conformed to.

Several sites of archaeological interest have been identified by Gwynedd Archaeological Trust. The project team are working with the Trust to investigate these areas by 'excavate and record'. To date a locally important wide gauge tram site at Hibernia Row has been excavated, recorded and information relics have been donated to the local maritime museum for display.

The EAW have been consulted regularly regarding temporay discharges and waste. Ongoing measures are in place to minimise the impact on the environment from these aspects of construction. As well as the EAW regulatory role in approving the schemes engineering solutions, construction activities have involved close liaison with the EAW regarding temporary discharges from dewatering activities along with the waste regulations. These activities are carried out in a manner that minimises any adverse impact on the environment.

Public relations
In recognising the issues during the scheme's planning process, DCWW employed a full time liaison officer. The role involves identifying stakeholders concerns and expectations and then managing them, within the schemes engineering constraints.

Local Community and County Councillors, along with the liaison group, have been encouraged to actively participate and understand the reasons and need for the scheme. At the same time the Project team have developed an awareness and responsibility to consider how best to meet the expectations of stakeholders.

Stakeholder engagement has taken the form of project update notes, public exhibitions, school visits and meetings, the latter have either been on a personal or group level as appropriate. Additionally, stakeholders have been encouraged to visit the project office which is located next to the proposed wastewater treatment works. Public exhibitions have been carried out throughout the catchment area either at local community venues or held in a mobile caravan on the site of the proposed new works.

In recognising the potential safety issues associated with construction works and children, the school site visits have explained the need for the scheme but also stressed the potential dangers associated with construction activities. To alert the children to these dangers, site safety poster competitions have been held with the winning posters being displayed on fencing at the local construction sites.

Odour control
The prevention of odour nuisance resulting from the future operation of the **Holyhead WwTW** is central within the conditions attached to the planning permission granted to the scheme. It is the desire of Dwr Cymru to act as a good and responsible neighbour and as such ensure that the future operation of the scheme does not cause odour nuisance.

To achieve this, DCWW has included within the scheme, odour prevention and odour control measures. These include septicity control measures at the terminal pumping stations of Morawelon, Trearddur Bay and Turkey Shore. At these locations, chemicals are dosed into the sewage flows, preventing the sewage from becoming anaerobic. In addition, all storage tanks within the catchment will be fitted with passive odour control units, these will remove any residual odours prior to venting to the atmosphere. ■

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