Bangor Beach Road Pumping Station

using a combination of retrofitting and new assets to deliver shellfish water quality improvements

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Welsh Water

The Bangor Beach Road Sewage Pumping Station (SPS) Project is part of Dŵr Cymru Welsh Water's (DCWW) work to reduce the water quality impact of sewer overflows on the Menai Shellfish Waters. The Menai Strait is a unique marine environment between Anglesey and North Wales, with the water quality directly impacting the shellfish quality and hence the local fishing economy and importantly, the ability to sell shellfish to European markets. Bangor Beach Road SPS is located in the northeast of Bangor in the Hirael area, close to the sea front promenade, next to King George's Field playing field.

The new below-ground stormwater storage tank under construction - Courtesy of Griffiths Ltd

Project background & solutions options

The Bangor Beach Road SPS Project was developed after feasibility and assessments studies had been completed for the wider wastewater catchment, including extensive hydraulic and coastal water quality modelling.

These showed that the Bangor Beach Road SPS was an impacting asset and that a solution, to reduce storm overflows here, was an effective approach to improving water quality. The asset was on the National Environment Programme list to reduce its impact on the shellfish waters, placing obligation on Welsh Water to deliver the solution by April 2025.

Options were investigated at the SPS including increasing pass forward flow, local treatment, and flow removal, however, to deliver the outcome within the time-frame, storage was the best solution.

Project drivers & goals

The aim of the project was to divert storm flow (from overflowing to the Menai) to the new storm storage tank, where it will be stored offline until flows have reduced, at which point it is returned to the network for treatment.

The solution included:

- Retrofitting the existing sewage pumping station.
- Provision of new storm pumps to deliver up to 1,000 l/s to a new 4,300m³ below-ground stormwater storage tank (under the adjacent playing field).
- Associated mechanical and electrical equipment.
- Reinstatement of the playing field facilities.

Project scope & undertakings

The project forms part of wider catchment interventions including sewer improvements, tidal ingress removal, infiltration removal and future increases in treatment capacity at the receiving wastewater treatment works. The project comprises of two key elements:

- Retrofitting of the existing SPS with new storm pumps.
- A new below-ground (off-line) storm storage tank.

Welsh Water contracted the project as separate civil (stormwater storage tank) and mechanical and electrical (sewage pumping station) elements, with Arup acting as Welsh Water civil design consultant, Griffiths Ltd as civil contractor and Eric Wright Water as MECIA design consultant and contractor.

Bangor Beach Road SPS: Supply chain - key participants

- **Civil design inc. geotechnical, coastal & pipelines**: ARUP
- **Civil contractor**: Griffiths Ltd
- **M&E design & contractor**: Eric Wright Water
- **Storm tank design & construction**: FP McCann Ltd
- **Storm pumps**: Xylem Water Solutions
- **Pipework supply**: Saint Gobain PAM UK
- **Pipework & mechanical instal**: Mectec Engineering NW Ltd

Sewage pumping station retrofit

The existing SPS takes wastewater from the Bangor catchment and pumps it up to Treborth WwTW for treatment. During storm conditions, when the flows to treatment are exceeded, storm flows had historically been screened and then pumped via a long sea outfall to the Menai.

The SPS was constructed on an area of largely made ground, set out from the sea front. During the optioneering stages, the location was considered costly and complicated to add new wet wells or pumping stations. This drove the design team to investigate options for retrofitting the existing SPS, which would have the additional benefit of less carbon and cost than constructing a new asset.

The existing SPS has three wet wells, which served the flow to treatment and overflows to the long sea and short sea outfalls. One of the overflow wells was re-purposed to locate the new pumps which serve the new storm tank. Design reviews including suppliers ensured that the existing wet wells were of sufficient dimension and could achieve the designed flow conditions with the new pumps.

Eric Wright's mechanical and electrical works within the SPS also included mechanical pipework, valves, controls and power for the storm pumps and ensuring the integration of existing controls. This was complicated because of the multiple weirs and screens within the existing asset and the multiple overflow routes. This was a collaborative approach supported by hydraulic modelling (by Arup) and surge analysis and system checks by specialist consultants.

Stormwater storage tank

The new stormwater storage tank is a 4,300m^3 below-ground prefabricated concrete tank, located below the King Georges playing field adjacent to the SPS. The required volume of storage was determined from earlier modelling, which showed that this size would retain storm flows for all but the largest storm events; reducing overflow to 10 times per year on average, which would achieve the required water quality improvement.

The storm tank was designed and delivered by FP McCann, and is a rectangular arrangement made from precast concrete walls and roof, with a cast in situ base. The tank is approximately 28m by 48 m and ranges from 3 to 4m deep. The tank has a slight longitudinal fall and is divided into lanes by internal walls to aide flow distribution and reduce siltation risks. Access points were provided at each end of the tank lanes. The design had to accommodate constraints on access points due to the playing field above the tank - no manhole covers could be situated within the football pitch area.

Rising main

The 900mm diameter rising main pipe between the sewage pumping station and the stormwater storage tank posed various design challenges. The pipeline needed to exit the pumping station, aligning to existing connection points, traverse the SPS revetment in the marine zone, cross a flood bund (by others) and promenade

The new below-ground stormwater storage tank under construction Courtesy of Griffiths Ltd

New storm pumps 4 & 5 - Courtesy of Eric Wright Water

The new below-ground stormwater storage tank under construction Courtesy of Griffiths Ltd

New external pipework to storm tank - Courtesy of Eric Wright Water

(by others) to the storm tank. With the added complication of two designers undertaking the above and below-ground sections respectively and third parties working on other construction projects within the vicinity.

King George's Field playing field reinstatement

Coordination of the tank works, and construction of the associated pipework and civil elements were undertaken by Alun Griffiths. Arup, as Welsh Water's designers, and Alun Griffiths worked extensively with landowners of the playing field to provide a reinstatement design for the football pitch; providing a valuable community asset to a high quality standard. The final design included a pitch drainage system, tree planting and tied into surrounding improvements to the promenade (by others).

Innovations, cost savings & carbon reduction

Carbon savings for this project were realised from the decision to retrofit the existing facility and not building a new storm pumping station, and by choosing to re-purpose the wet well within the existing SPS. This also reduced time on site and hence is assumed to reduce the health and safety risks.

Eric Wright worked with the pump suppliers and engaged specialist hydraulic advice to ensure the system would operate as designed. Although retrofitting was difficult and attention needed to be paid to the condition of existing equipment, especially at interfaces, this approach reduced carbon, the need for land purchase, and provided a resilient asset for the long term.

For the new stormwater storage tank, precast concrete proved suitable for the given ground conditions and the sewage application and offered savings in time, in design and on site.

The location of the tank also posed a risk to Welsh Water Operations, with no easy access for inspections. CCTV was therefore included to monitor conditions within the tank without the need to enter the tank and help plan maintenance. The internal arrangement of the tank was designed with the aim to reduce the need for maintenance and entry to the tank for cleaning. It was laid out in profiled lanes with an inlet manifold to flush flows down each lane.

The football pitch above the tank was a general use playing field before the project. Welsh Water has reinstated this community asset, with the design including pitch drainage and additional trees in the surrounding area. Welsh Water worked extensively with the local council (landowner of the field) to ensure the solution was in keeping with their recent improvements to facilities in the area and provided a long-term community benefit.

Conclusion/summary

The retrofit of the Bangor Beach Road Sewage Pumping Station and the stormwater storage tanks retrofit were commissioned in March 2025; achieving the NEP regulatory date. This provides Welsh Water with a new asset and will contribute to water quality improvements in the Menai.

Limited storms have occurred since completion, but the improved SPS and tank have been shown to operate as designed. At the time of writing (July 2025), the team are on site finalising the reinstatement and completing a small element of coastal protection.

Welsh Water continue to make improvements within the catchment, with planned schemes to increase storm treatment capacity at the receiving WwTW and further targeted sewer improvements to reduce infiltration and reduce risks of saline intrusion. Locations across the catchment feasible for RainScape (including SuDs) have been identified for future catchment resilience.

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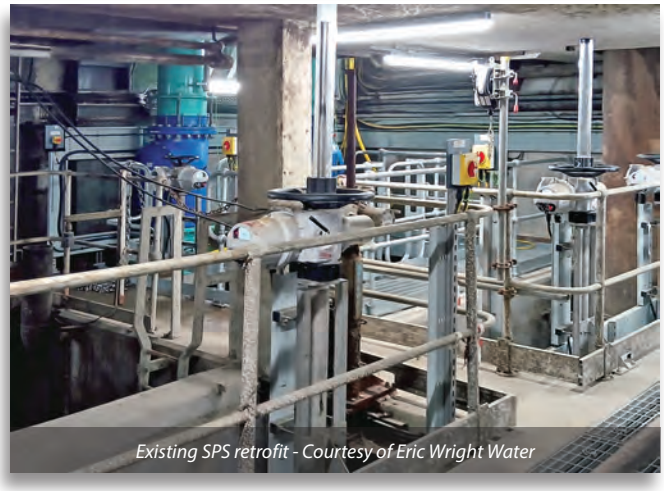
New storm pumps 4 & 5 - Courtesy of Eric Wright Water



Existing SPS retrofit - Courtesy of Eric Wright Water

CCTV image inside new storm tank during commissioning
Courtesy of Eric Wright Water

Bangor Beach Road PS Project - Courtesy of Griffiths Ltd