

Steynton Pumping Station

planning for success

by
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The village of Steynton is located approximately two miles to the north/north-east of Milford Haven in South Wales. The existing Steynton Wet Well/Pumping Station is adjacent to the A4076, the main road linking Milford Haven and Haverfordwest. Dwr Cymru Welsh Water undertook a 34-week project to upgrade the Pumping Station which contained a high level unscreened overflow, and replace with a new screened CSO, Wet Well and Valve chamber. This would be accompanied by a new 250m² Asset International Weholite Pipe Storage Tank (2.5m diameter pipes). Associated new manholes, outfall, outfall headwall, concrete access road and hard standing area would complete the arrangement.



Excavation to Formation

Courtesy Dwr Cymru Welsh Water

On receiving the preliminary information on the works, principal contractor Morrison Construction identified a number of main issues:

- The existing Pumping Station and proposed new works are located within the Steynton village green, adjacent to the main link road running from Haverfordwest to Milford Haven. This coupled with the close proximity of a comprehensive school and housing, meant careful planning would be required to minimise impact, through disruption, to the local community.
- The size and depth of the excavation that would be required to install the Storage Tank. The Storage Tank would consist of two (no.) 2.5m diameter storage pipes 22m long running parallel to each other. The depth of the excavation would vary from 7.5m on the high side to 5.5m on the low side.

- The volume of material to be excavated, estimated to be 2000m³. (The disposal/storage and muck build up on adjacent roads would need detailed management)
- Installing the 2.5m internal diameter pipes with a labour force unfamiliar with Asset Weholite Pipes.

In order for the project to be a success these main issues would have to be addressed, along with the other inherent issues which may present themselves during the project.

Minimising Impact

In order to minimise the impact of the construction works a sensitive approach was taken prior to going on-site. Letters were circulated to local residents detailing the start date, nature of the works and reasons for the planned works. This was backed up with extensive liaison with the local council.

In order to isolate the site safely a solid timber hoarding was erected, encompassing the whole site. Timber hoarding was chosen as a preference over standard Heras fencing for a number of reasons:

- Due to being adjacent to the main road a clear view into the site may prove a distraction to passing motorists, possibly contributing to a road traffic accident.
- Timber hoarding would provide added security in an area frequented by children on a daily basis.

Main Excavation

Limited ground investigation prior to the project highlighted the presence of rock at 2.5 to 4m depth dependent on location within the site. In order to further quantify the rock and select an appropriate excavation method to proceed with, an independent Geologist's services were engaged. Dr J.S. Noake joined the project team for two days and through bespoke trial holes, quantifying of the strata and careful consideration, an appropriate method to proceed with was identified.

The 2.5 to 4m layer (Layer 1) was identified as a medium dense to dense, cohesionless, slightly silty sand with angular gravel and cobbles of marly sandstone. The underlying bedrock was identified as a thick bedded, wide space jointed, extremely strong marly sandstone of lower Devonian age (Layer 2).

The two differing layers required a dual approach in respect of stability of the excavation during pipe installation. 'Layer 1' was excavated down to underlying bedrock level. Due to constrictions in site width a 45° angle of batter was not achievable and mechanical shoring was not an option due to excavation width. The proposed solution was to install a Blockstone wall bedded in concrete at the

underlying bedrock level. This coupled with the use of rock netting provided stability to the exposed slope and prevented loose debris falling into the excavation below.

'Layer 2' required no additional shoring. Standard excavation methods were adopted utilising a 34 tonne excavator and rock hammer.

Excavated Material

Due to the nature of the site and volume to be excavated, keeping the excavated material on site was not a viable option. Suitable landfill sites were available within the locality, however options were sought to divert away from landfill for a number of reasons:

- Environmental negative impacts in directing waste to landfill.
- Inherent high cost of sending high volumes of waste to landfill.
- Due to the quality of the rock excavated - site did not view the material as waste, but a suitable re-usable material.

The Area Works Manager, Milwyn Jones, identified an approach that could be adopted to benefit the site - the WRAP protocol (Waste Resources Action Programme). The WRAP protocol provides a tool for the treatment of waste from construction excavation activities with the intention of re-use. In order to work under the WRAP protocol guidance was sought from Mr Graham Bishop of the Wales Environmental Trust (WET).

Through consultation a WRAP action document was produced unique to Morrison Construction. Due to not being able to store the material on-site, alternative locations were sought to process the material under WRAP. The suitable location identified was a Welsh



Processed Top Backfill Layer

Courtesy Dwr Cymru Welsh Water



Steynton Nearing Completion

Courtesy Dwr Cymru Welsh Water

Water WwTW site located at Merlins Bridge, Haverfordwest. The area was deemed suitable as it was secure and there was a sufficient cleared area to store the excavated material, prior to processing and re-distributing.

Morrison Construction applied for an exemption under 'Paragraph 13' from the Environment Agency in order to carry out the proposed activities at Merlins Bridge, which was granted by the EA. The material was hauled to Merlins Bridge where it was processed in a number of ways to produce a product fit for re-use. Through the use of grated sieve buckets, selective screening and crushing on site a product was produced in accordance with the 'Earthworks series 600' classification 6A.

In accordance with Asset International's installation process for their Weholite pipes and with approval from Asset's Senior Technical Engineer, Vasilios Samaras, the material was deemed suitable for backfilling up to the previous existing ground level. This resulted in the re-use of 750m³ of the 2000m³ initially excavated.



Screening at Merlins Bridge

Courtesy Dwr Cymru Welsh Water

The remaining material has served several other Morrison Construction projects within the area for applications such as site compounds and haul roads. This has resulted in cost savings for the projects where virgin aggregate would have been utilised and significant environmental benefits linked to the recycling of material and diversion of waste from dwindling landfill resources.

Weholite Pipe Installation

In light of the scale of the installation, Asset International spent half a day on site conducting a presentation detailing the installation process and answering questions on the nature of the process and the reasons for the tolerances. The course was very informative and gave the workforce the confidence to carry out the proposed work. This resulted in the completion of the two 22m long Storage Tanks in a two week period. Asset International was invited to site subsequent to the installation and commended the site on the speed of installation and quality of installation. Highlighting in particular that, "the tolerances viewed between pipe joints were excellent".

These sentiments have been echoed by various parties, and goes to prove that 'careful planning and commitment' can go a long way to ensuring the success of a project whether large or small.

The project team comprised Morrison Construction (principal contractor), Imtech Process (process contractor), Black & Veatch and Alan James & Sons (lead designers) and J McCarthy and Spencer ECA (principal sub-contractors).

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