Barnby Moor Sewage Pumping Station

refurbishing an existing asset that had reached the end of its working life presented a number of core challenges

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Barnby Moor Sewage Pumping Station in north Nottinghamshire serves 80 residential properties and a 50 room hotel. The station consisted of a control building situated over the wet well, housing an outdated control panel and 2 (No.) vacuum-primed centrifugal pumps delivering flows via a short 80mm diameter PVC rising main. A number of core challenges had to be overcome during the installation of the new pumps, pipework, valve chamber and electrical control equipment, including working in a very restricted site, renovating rather than replacing the wet well, demolishing the existing building and the provision of off-road parking and improved site access.

Existing SPS - Courtesy of NMCNomenca

Completed SPS - Courtesy of NMCNomenca

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Challenges and design solution

The scheme presented several core challenges to be satisfied:

- The existing site being restricted on 3 sides by residential housing and privately owned gardens.
- The construction and site access was off a private residential road.
- The maximum site dimensions 11m x 6m.
- The operation of the existing SPS site had to be maintained throughout the construction period.
- Land purchase at current site was not available.

The solution had to adhere to the Severn Trent Water template design parameters, which meant that conventional refurbishment of the existing station would not be possible on the existing site footprint and a bespoke solution was therefore necessary.

Procurement

Under the AMP5 Infrastructure Framework arrangements, the team, comprising NMCNomenca, STW and strategic supply chain partners worked collaboratively to provide an innovative solution. The engagement of NMCNomenca included the development of the design to improve the affordability of the solutions and to address the key drivers of:

- Reduce H&S & environmental risks.
- Reduce waste and environmental impact.
- Reduce cost.
- Reduced footprint and land usage.
- Reduce site time and disruption to operations staff and local community.
- Reduced failure and site testing/commissioning duration.
- Consistency of design/construction.
- Waste generated at point of production.

Solution developed

It was identified at an early stage by the design team that the existing wet well could be renovated and reused. This would provide an opportunity to reduce the programme, which would minimise disruption to local residents and customers whilst also providing cost savings and reduced waste.

In order to achieve this, construction of a template below ground valve chamber would not be possible due to the reduced space

on the existing site. A previously developed precast modular valve chamber was considered however this was dismissed also due to the lack of available space and construction difficulties. It was therefore decided to design a bespoke above ground valve chamber housed in a GRP kiosk.

Improved access and off road parking for the Severn Trent Water operators was also achieved on this confined site as the new valve chamber arrangement allowed demolition of the existing asset expired building.

The innovative solution agreed by the project team deviated slightly from the template solution and required pre-approval by the Severn Trent Water Operations Manager.

Construction

Overpumping was set up to maintain the operation of the pumping station whilst isolating the existing plant and chambers. This allowed the existing M&E equipment to be removed and the building was demolished to allow room for the construction works.

During a pre-construction survey the building was found to contain asbestos, this had to be removed by trained operatives and disposed of by a specialist sub-contractor.

The existing wet well cover slab was then removed and the well refurbished and re-benched to accommodate the new submersible pumps and pipework. The new cover slab was precast off site, delivered and installed. The use of precast was considered to be a safer solution and also reduced working and deliveries to this extremely confined site.

M&E equipment including the MCC was then installed. The above ground pipework was lagged to protect it from frost and a bespoke GRP kiosk was manufactured off site, delivered and installed.

Community

The existing pumping station is located in a 11m x 6m plot, essentially within and adjacent to customer gardens and is accessed off a private road belonging to large residential properties.

The construction traffic and vehicle movements and deliveries were a major concern to the occupants of the adjacent properties. Major deliveries of materials were scheduled between 08:30 and 15:00, to reduce impact on morning journeys to work and afternoon school runs. Working practices and traffic management were fully explained to the impacted residents.

To further minimise disruption a nearby Severn Trent Water site was utilised to house the site compound including welfare facilities and material storage.

Value added through the solution

The design solution developed and the construction techniques delivered value to client, the customers, the shareholders and the residents through:

- Reduced footprint and land usage.
- Speed of construction: duration reduced by some 4 weeks over template solution meaning reduced disruption to residents.
- Reduced disruption to operations staff.
- Engaged local community supportive of works.
- 'Factory conditions' for precast concrete construction of cover slab:
  - Improved finishing tolerance.
  - Not weather dependant.
  - Consistency of design/construction.
- Reuse of existing wet well/above ground valve chamber.
  - Smaller footprint for construction as compared to conventional solution.
  - Less environmental impact due to reduced waste.
  - Noise and vibration compaction around structures not applicable.
- Safety: reduced need for excavation, factory condition manufacture of precast concrete cover slab and GRP kiosks.
- Surplus material for disposal kept to absolute minimum and hence reduced transport movements off site.
- Waste generated at point of production only for the precast units.

Lessons learned

Lessons learnt from a previous sewerage pumping station were developed and incorporated into this scheme. Further refinements are currently being implemented.

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