

# Good Architecture in the Water Industry

four examples of architectural designs at water and wastewater installations for Thames Water and the Olympic Delivery Authority

by John Lyall

The Victorians were not only great engineers, they celebrated their technical achievements with buildings for pumping stations, reservoirs and sewers which were designed with delightful grace and long-lasting impact. They learned this from the Romans who integrated architecture with engineering on a large scale and ensured that their civilised infrastructure was not only durable and functional, but that it played its part in the aesthetics of the city vision. Apart from a few isolated examples in Britain, we lost this inherent instinct to design beautiful infrastructure buildings in the second half of the 20th century. Many new installations did not appear to merit the involvement of an architect. Perhaps this was because the water and sewage plants were on the fringes of towns and cities and an *'out-of-sight out-of-mind'* attitude prevailed with planners and water companies. The latter obviously wished to keep costs down, so that metal or brick boxes with tin or GRP roofs became the norm. However, it is evident nowadays that the cost of a quality designed building envelope is relatively minor, compared with the costs of engineering equipment installed.



*'Pinky & Perky': The odour control tanks at Pudding Mill Pumping Station - Courtesy Lyall Bills & Young*

## Planning authorities demands

Increasingly local planning authorities are insisting on better design for new infrastructure buildings and the input of talented architects in the process. This is emphatically supported by Design Council CABE, the government's national design watch-dog. This experienced body is concerned that such installations from waste-to-power plants, nuclear power stations, pylons and pumping stations, should be better designed as they will have a lasting impact on both towns and countryside because of their sheer size.

Many of the historic Victorian pumping stations are listed buildings, even though they may now be functionally redundant. English Heritage (EH) and the Victorian Society often become involved in a new water industry development, if it is going to become a neighbour and adversely affect the setting of the old building. This does not mean at all that the new building should be a Victorian pastiche; far from it! EH know that a good, modern design of the right scale and proportions can enhance the setting of its historical companion on the site.

The late 1980s and 90s saw three excellent water industry buildings built in London by architects John Outram, Richard Rogers and Allies & Morrison; but these were exceptional. The presumption by the water companies was that the consultant engineer or the contractor would look after the design of the building.

It was against this background that architectural practice, Lyall Bills & Young (LBY), was invited to compete on a design for one pumping station for the London Olympics site, and ended up designing four very different buildings for Thames Water and the Olympic Delivery Authority (ODA), and these are described below.

The first invitation came from tunnelling contractors, Barhale, who felt their chances of winning the underground piping contract for the Stratford 2012 site would be enhanced if they could include a visionary building for the 'jewel in the crown', the pumping station at Pudding Mill. Indeed the ODA were very insistent that all buildings on the Olympic site, not just the sports venues, should be of excellent architecture. They helped to promote a *family* of large infrastructure buildings which would be simple and robustly made, but also look beautiful. These structures for energy, power, waste and water would, after all have to last for many decades after the games in 2012.

For Lyall Bills & Young, as architects, the success of these Olympic buildings for Thames, led to an even larger project at Crossness, which is described later.

### Pudding Mill Pumping Station

This facility is at the hub of the network of new small-bore tunnels which collect sewage from all over the Stratford Olympic site. It has an underground chamber 16m deep and 12.5m in diameter, which is divided into a wet well and a dry well. A series of pumps transfer the sewage from the wet well up to the adjacent Victorian Greenway Sewer, and then to Abbey Mills; less than a mile away.

The early precedent design concept given to LBY was of a rectangular shed sitting on top of a circular caisson set into the ground. By asking the right questions of the engineers, LBY worked out a way in which the super-structure could also have a circular plan, by re-arranging the control room, the transformer room and odour control tanks. The resulting cylindrical design meant that the thick foundation ring which holds down the underground tank could also be used to support the super-structure. This not only saved money, but resulted in a building which looked good and followed the curve of the road.

As an un-manned facility LBY only enclosed those aspects which needed protection in *rooms*. The large odour-control tanks were exposed to public view and painted pink (the contractors christened them Pinky and Perky!). For the above ground building precast concrete was used (as with the rings of the underground caisson) but used special etchings via rubber moulds in the large vertical panels. These images cast into 3m high concrete panels were computerised enlargements of the original Victorian engineering drawings which we discovered in a plan-chest at Abbey Mills.

The idea is that the subtle, grooved indentations would weather well over the years with moss and lichen and become an enduring, quiet tribute to Sir Joseph Bazalgette, who made the nearby sewers possible. This was destined to be next to one of the main public entrance routes into the Olympic site, so the façade had to be attractive but very robust.

The 12m high ventilation shaft was also clad in etched concrete, and LBY decided to put a large glass lantern on top which would have a pale blue glow at night. The ODA loved this because the blue and the pink were two of the key London Olympic colours. Another distinctive feature is the green roof, which was a pre-requisite for most Olympic buildings, together with the bird and bat boxes secreted in the concrete walls.



Pudding Mill Pumping Station Odour Stack - Courtesy Lyall Bills & Young



Etched concrete panels at Pudding Mill - Courtesy Lyall Bills & Young

### Old Ford Treatment Plant

This site sits by a bend in the river and very near the Olympic stadium. Two installations were built here; a new well-head to replace an old derelict Victorian platform, and a state-of-the-art black-water recycling centre. The site is covered with native trees and has been used for many years by the London Wildlife Trust.

The approach therefore, was to limit the size of the new buildings, and to allow them to cluster in a clearing in the woodland setting. Instead of one large structure for the well-head facility, the design broke it down by function, into five cubes set apart from each other. Each was clad in brown corten steel panels and the open cage for the central well-head pipes and valves was based on a silhouette etching of a photograph of the winter trees on the site.

It was a very subtle and well liked design, where each pavilion had a green roof, and the edges of the corten doors were highlighted in bright colours.

Across the landscaped compound the black-water recycling plant shares elements of corten steel in its external doors, but is mainly clad in vertical strips of larch on a concrete plinth covered with stone gabions. It is set amongst trees, but sited next to the Greenway sewer. The equipment inside extensively filters and treats the raw sewage, resulting in daily quantities of non-potable water which is used on the Olympic Park landscape.

As is often the case, the height of such installations is dictated by working dimensions required to lift and transport equipment when it needs replacement. LBY's role as architects was very much to allay the fears of local residents (the site is overlooked by blocks of high-rise flats) and produce an attractive design which would weather well over time. A particularly softening visual and environmental feature is the bio-diversity green roof, which is rich and lush with vegetation in the spring and summer.

### Stratford Box Pumping Station

As London's water table can fluctuate in height, some stability is needed to protect the water pressure from disturbing the Stratford Box railway caisson, which takes Eurostar trains to St. Pancras. The need for an un-manned stand-by pumping station on 24-hour service resulted in a project in a relatively inaccessible, but still visible, site in the London Olympic Park, bounded by railways and fly-overs.

Yet again, LBY worked with the engineers to understand the technical brief so that, rather than encompass all the facilities in one big shed, a scheme could be designed which could spread the linked-up elements in a more relaxed fashion over the available landscape. This landscape is dominated by a large balancing pond, which is used for the pumped water. This is surrounded by shrubs and weeds, and used by wild fowl.

The design has utilitarian rooms for sub-station controls and sampling above ground, with wells, pumps and chambers below ground. The whole composition is linked by a series of rectangular and circular plinths. These are clad in the silvery-grey bricks as the rectangular buildings above. It is set out like a modern archaeological site, where the concrete and brick defines what it underneath, and grass is allowed to permeate and surround. With a nod to the work over at Old Ford, the door frames set into the grey brick are brightly coloured steel, and there is a cube of mesh over the well-head.

### Crossness Enhanced Digestion Plant

At the outset, Thames Water needed exceptional architecture at Crossness as the new building would be a tall and wide presence on the south bank of the River Thames, and would be sited adjacent to the listed, and historic Victorian pumping station designed by Sir Joseph Bazalgette.



Old Ford WTW - Courtesy Lyall Bills & Young



Old Ford Pumping Station wellhead enclosure - Courtesy Lyall Bills & Young



Stratford Box Pumping Station - Courtesy Lyall Bills & Young

The Crossness Enhanced Digestion Plant is a sludge cake storage and dewatering facility. The building houses the final stages of a process which renders sewage sludge into fertiliser cake. The cake is stored in the building before being freely distributed to farmers who arrange pick-up in convoys of articulated trucks. The cake material is added to fields as fertiliser, proving a valuable and sustainable use for what was once considered as waste.

An imaginative cluster of roof forms has been created in response to the Architects studying and understanding the functional processes inside the building, requiring different heights, and organised in three main lateral zones of activity.

The building has a dense and exciting composition of rectangular walls and corners, with a blend of tough, heavyweight materials at low levels, and more lightweight materials higher up, punctuated by careful use of glazing and louvers. The massing is intended to give a controlled, mannered and timeless expression to what is a large and important new addition to the Thameside landscape.

The building is divided into distinct zones to reflect the processes inside: the cake storage areas, the belt press hall and the loading bay. The belt press hall on the first floor houses the processing plant and welfare facilities.

### External Appearance

Lyll Bill & Young's design had to meet with the approval of conservation officers at English Heritage, and the design officer at Bexley Council's planning department. Models, 3-D views within the site context and display of materials were all important considerations to obtain the planners recommendation for assent.

Externally, the scheme is underpinned by a strong, linear composition of concrete walls, surmounted by dark grey cladding panels. However, the largest block at the eastern end and the tall, rectangular flue facing the river, are both highlighted by the finish of bright iridescent orange panels of Alucobond, creating a cheerful, expressive statement on the waterfront.

Large openings of translucent polycarbonate glazing punctuate the building in various key areas. These openings allow daylight to penetrate at high level to main working zones, and glowing with artificial light at night. A similar in-set panel of glazing shines out at night at the top of the tall rectangular orange flue, enhancing the building's landmark status on the Thames.

Closer up, the precast concrete panels on the riverfront elevation (visible to pedestrians on the tow-path), are etched with Victorian engineering drawings from the nearby historic pumping station. This echoes a technique which the practice pioneered in their successful circular pump house at Pudding Mill.

### Good Value and Environmental Impact

Once again, Lyll Bill & Young have demonstrated how good architecture can add value, without increasing costs, and enable a complex engineering installation to be welcomed by planners, historic conservationists and the public. The building not only created a dignified, but modern, companion to Bazalgette's 19th Century triumph, especially when viewed from the river, but enables Thames Water to be justifiably proud of one of their latest contributions to London's infrastructure.

### Conclusion

I encourage water companies across the UK to use good architects on their new buildings, however small, and become more conscious of their contribution to the built environment.

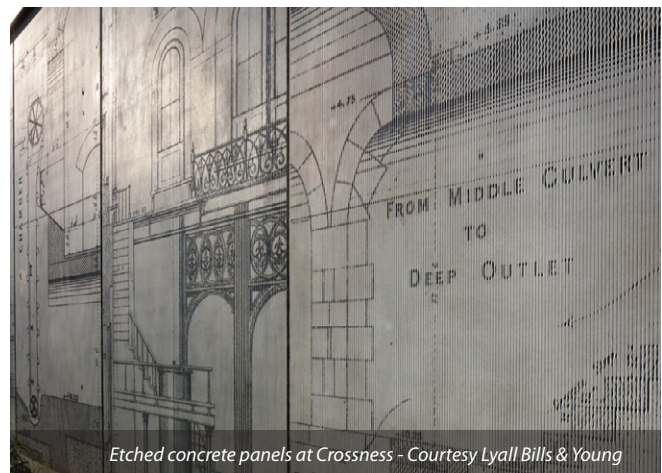
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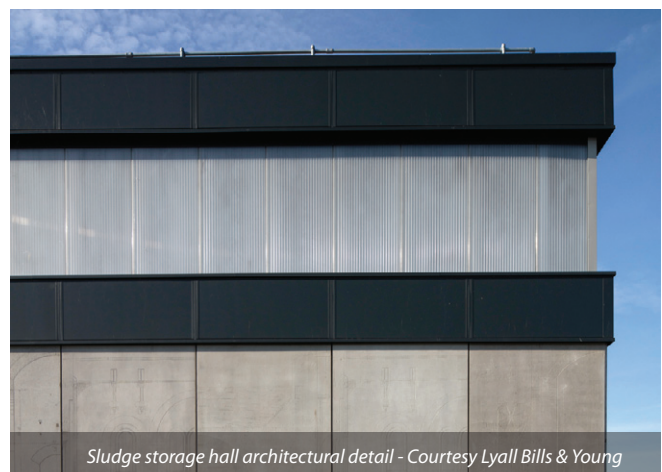
*Crossness sludge cake building - Courtesy Lyll Bills & Young*



*The cake halls at Crossness - Courtesy Lyll Bills & Young*



*Etched concrete panels at Crossness - Courtesy Lyll Bills & Young*



*Sludge storage hall architectural detail - Courtesy Lyll Bills & Young*