TEDDINGTON & HAM HYDRO - PLANNING VARIATION APPLICATION
DESIGN & ACCESS STATEMENT

Contents

1 Introduction

We are making an application for a variation to the approved planning application to demolish a section of weir and to install 3x 164 kW reverse engineered Archimedean screw turbines to generate hydroelectricity (***14/3732/FUL)***. This Design and Access Statement is a supplement to the original Design and Access statement and shows areas where the variation is different from the approved application. This forms part of a suite of documents relating to the application to construct a turbine to generate electricity at Teddington. This document sets out the design rationale of the Teddington & Ham Hydro team and provides information about how the designs have evolved to meet aesthetic considerations within the historic context of the original and recent structures at this location. It also sets out how the requirements of noise management, environmental considerations, flood management and safety of river users has been achieved, within the context of a proven and reliable technology.

2 Reasons for the Variation Application

The key reason that we have chosen to apply for a variation to our planning approval is based around flood risk. The original application required that the scheme would produce no additional flood risk. Both the Planning Committee and the Environment Agency were satisfied that this would be the case – the scheme that has been granted planning permission provides no addition flood risk than that which is already present. However, many interested stakeholders would have liked to the scheme to have gone further and actively improved flood mitigation, rather than maintain the status quo. Furthermore, with the planned Thames Scheme, additional flood mitigation will be provided by the Environment Agency in due course at Teddington Weir. Could our scheme form part of this plan? If so, it would provide a material benefit to local residents while at the same time it could reduce costs to tax payers by providing this required flood mitigation as part of our scheme. The Board of Teddington & Ham Hydro Cooperative Limited felt that this was a prize that was worth pursuing.

Fortunately, advances have been made in hydro power design since our first application was submitted such that this increased flood mitigation is indeed possible. We achieve this by changing our technology from a fixed screw to a variable angle screw that can be lifted completely out of the water and above the 1-in-100-year flood event plus climate change. Under these circumstances, with our screws lifted, there is no obstruction to the flow of water, while the planned cross sectional area of the free flowing water in this event is significantly greater than currently provided. As a result of this we are in early, but formal, negotiations to provide additional flood relief at Teddington

Teddington & Ham Hydro Cooperative Limited is a Registered Cooperative Society number 031557R

Weir for the Environment Agency. This application for a variation to planning approval allows for a 109% increase in flow capacity in a full flood event. Please see cross-sections included as part of this application for more details.

In addition to significantly improved flood relief, the new technology allows the scheme to have a significantly smaller overall footprint in both height and area. This may help those still concerned by visual impact, overcome these fears and rally behind the scheme. Furthermore, variable angle technology allows for great energy capture, and therefore improved environmental impact.

Above: The screws are not fixed and therefore can both be trimmed to maximise efficiency and in extreme flooding can be lifted out of the water to maximise flow, and minimise flood risk.

In a full flood event (in this case a 1-in-100-year flood plus the impacts of climate change) the picture below shows that the turbines have been lifted fully out of the water and provide no obstruction to flow whatsoever.

Edenvale & Young, authors of the original 2011 Flood Risk Assessment as Sub-contractors to AMEC, state in their accompanying letter: "The amended design involves raising the structures to a level clear of the 1 in 100 year plus climate change peak water levels during flood conditions: there will therefore not be any effective reduction in weir width. Due to the wider and deeper dimensions of the new design's turbine bays, which create a significantly larger cross sectional area when compared to the current weir and the older hydropower design, the impact of this new design will be that the flood risk will be even lower than the previous design"

3 Visual Impact

A dedicated document with visuals of before and after (using computer generated graphics) is included within this application. Our design team have worked hard to capture the essence of the weir and feel that we have adhered to the spirit and letter of the rules for sustainable development taking into account surrounding assets and views.

The architecture and engineering of the amended scheme are underpinned by a rigorous design logic.

The existing weir and roller sluice structure date to the 1930s, and are constructed in reinforced concrete, painted white. The paint extends down to pier level, below which they are left as raw concrete, since paint does not stand up well to immersion in dirty river water. The shapes that dominate the weir are the white arches of the sluices with recessed panels clothing the mechanism above. We have adopted the same model - raw concrete piers, supporting white-painted structures.

Each screw is supported by two arms, raised by electric blue hydraulic rams. The arms are braced in pairs, to ensure they work in unison and to prevent them twisting sideways when loaded. The curved braces in our design are a deliberate echo of the 1930s roller sluices, so they read as natural extension of the existing weir structure. As the braced arms are intended to continue the rhythm of the sluice arches, we have chosen to paint them white to match. This works well against the skyline and appears in harmony with the weir's architecture, receding into the vista as a whole.
The different plant components have been unified into efficient assemblies, avoiding the clutter of flexible hydraulic hoses and mechanical linkages around the generator housings. Screws, cradles, acoustic baffles, generator housings and plant machinery are now arranged in a straight line, enclosed within a continuous, spiralling steel canopy. They move as one unit, and can be swiftly raised above the 100-year flood level so as to pose no barrier to the flow. The round 'port holes' in the housing fronts (like the 'eyes' of the Thames Barrier precedents) not only add character, but function as ventilation exhausts for the machinery within. Beneath them are water-tight doors, which help protect the plant and form part of the acoustic insulation.

The net result of these design refinements is a clean, streamlined structure, with a far lower profile than the previous design.

Completely enclosed, it is both elegant and expressive, with its steel canopies capturing the spiralling motion of the descending water.

The following figures show the amendment within the extent of the existing approved design (upper figure, red line) and the amendment in profile compared to the existing design (lower figure, amendment is the lower drawing with blue turbine, existing design is higher in black and white).

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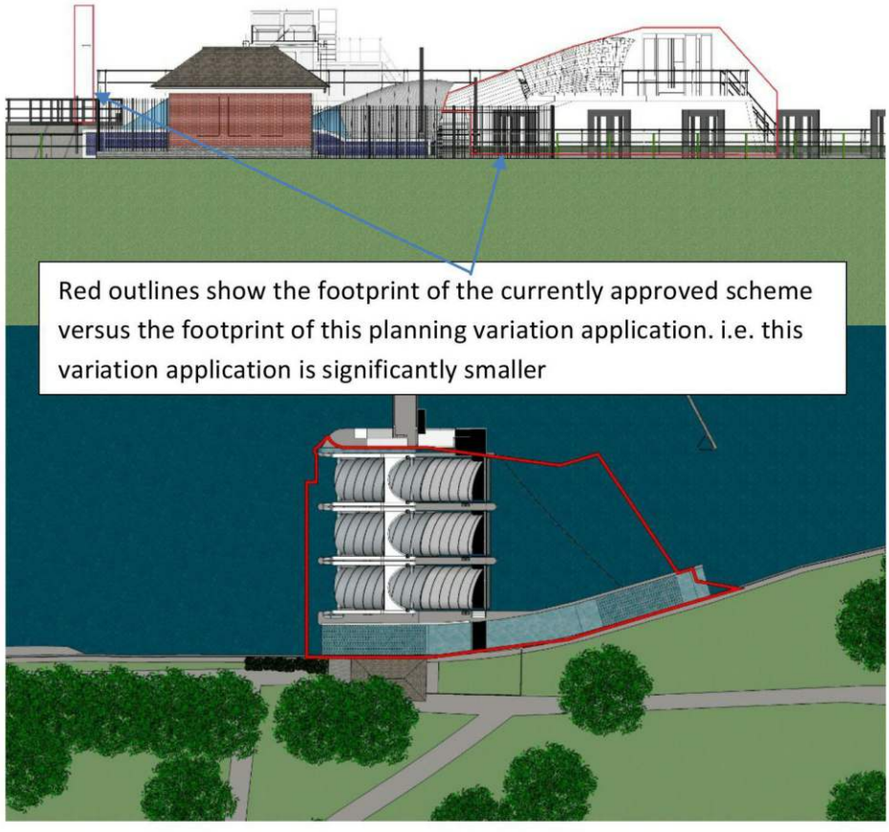

4 Noise mitigation

All previous noise studies remain valid from the original planning application. The key reason for this is that the same noise attenuation plans for that scheme are also present in this scheme, as will be the same strict noise conditions. Moreover, the noise models that were used to determine the likely noise output of the scheme at Teddington were based on the scheme at Romney (which is a variable angle scheme). Since this planning variation is changing the technology to a variable angle system (as at Romney) the schemes are more similar and therefore the findings are more, rather than, less valid.

Detailed analysis of the projected sound of the scheme and the mitigation measures are given in the documentation on noise contained within this application. In brief, the turbines themselves will each be enclosed in a semi-circular tube: this will mitigate any hydrodynamic noise (possible splashing sounds); in addition, the generators housings will be equipped with sufficient noise muffling to enable the scheme to be operated within the constraints placed upon it by LBRuT planning department.

Sound Solution Consultants Ltd concluded:

"… that by changing the design of the amended Archimedean screws at Teddington from fixed to tilting angle systems will make the amended development no noisier than originally calculated.

Rather, it is expected that the tilting system will be quieter than the originally proposed, fixed angle design, with further improvement at low frequency."

Stephen Jarvis, Managing Director – Teddington and Ham Hydro Cooperative Limited

London, 29th January, 2016

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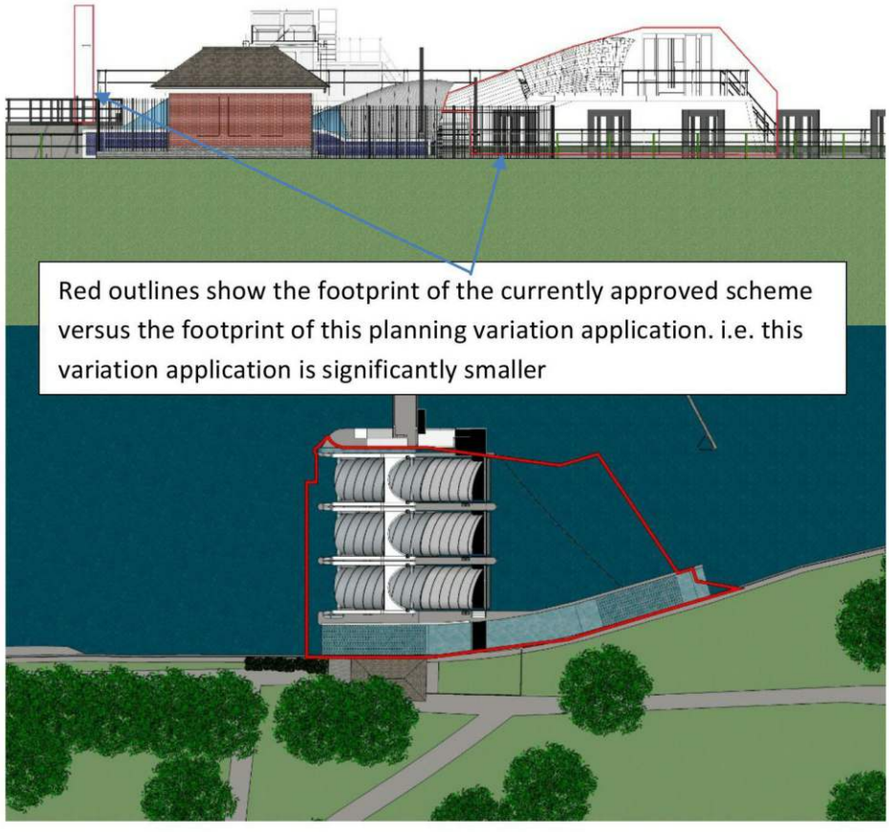

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