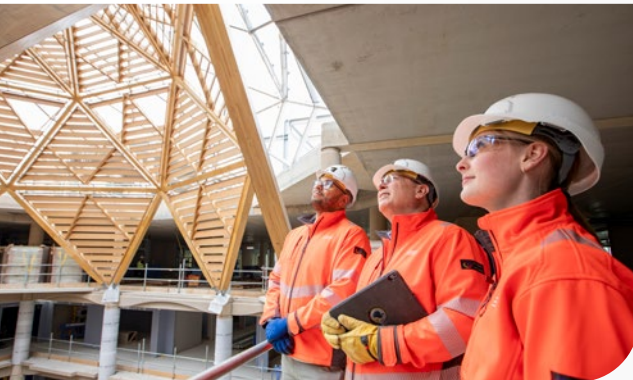




Case study

# The world's first concert hall built to Passivhaus standards, in the heart of Oxford University



The Stephen A. Schwarzman Centre for the Humanities is one of the largest single building projects ever undertaken by the University of Oxford, bringing together nine faculties and institutes, and seven libraries and collections into one home. Performance and public engagement are at the heart of the project, which will include a 500-seat concert hall, 250-seat theatre and a film screening area.

Strong sustainability credentials have been a crucial factor in designing and developing the Centre. Pushing the boundaries in service of humanity is a perfect representation of a shared vision for client and contractor. It is expected to be the **world's first Passivhaus concert hall** and the **largest Passivhaus building in the UK**.

Jennifer Makkreel, Deputy Head of Capital Projects at the University of Oxford said:

**"The Stephen A. Schwarzman Centre for the Humanities will be an important building for both the University and the local community. We have therefore pushed ourselves to create a building that will truly make a difference, and the partnership with Laing O'Rourke has helped us to realise that vision. By bringing together digital design, off-site construction and sustainable technologies and materials, this building will deliver a**

**uniquely innovative and sustainable solution. At each stage of the project, the team have collaborated to deliver a more sustainable building, ensuring that what we deliver will be beyond anything currently within the University and indeed the city."**

### Sharp focus on efficiency

Efficiency was a cornerstone of the project from the very beginning, aligning with the University's sustainability ambitions. Early on, the decision was made to build to Passivhaus standards, providing a progressive, best practice approach that will ultimately minimise energy requirements and limit the Centre's environmental impact for years to come once it is in use.

Passivhaus means that the heat losses from the building are reduced to such an extent that little heating is required, with Passivhaus Trust observing an **average 90% reduction in heating demand**. Most of the heat comes from "passive" sources, including the sun, internal kit and appliances, human occupants and warm air. The building is **optimised for energy performance**, combining an air-tight build with triple glazing, high performance insulation and specialist ventilation, ensuring that the building remains ambient while providing high air quality, so it's healthier for occupants too. In fact, the **insulation**

**used in the façade alone is enough to cover three football pitches! 100 photovoltaic (solar) panels** will help to provide renewable electricity to the building too.



### At a glance









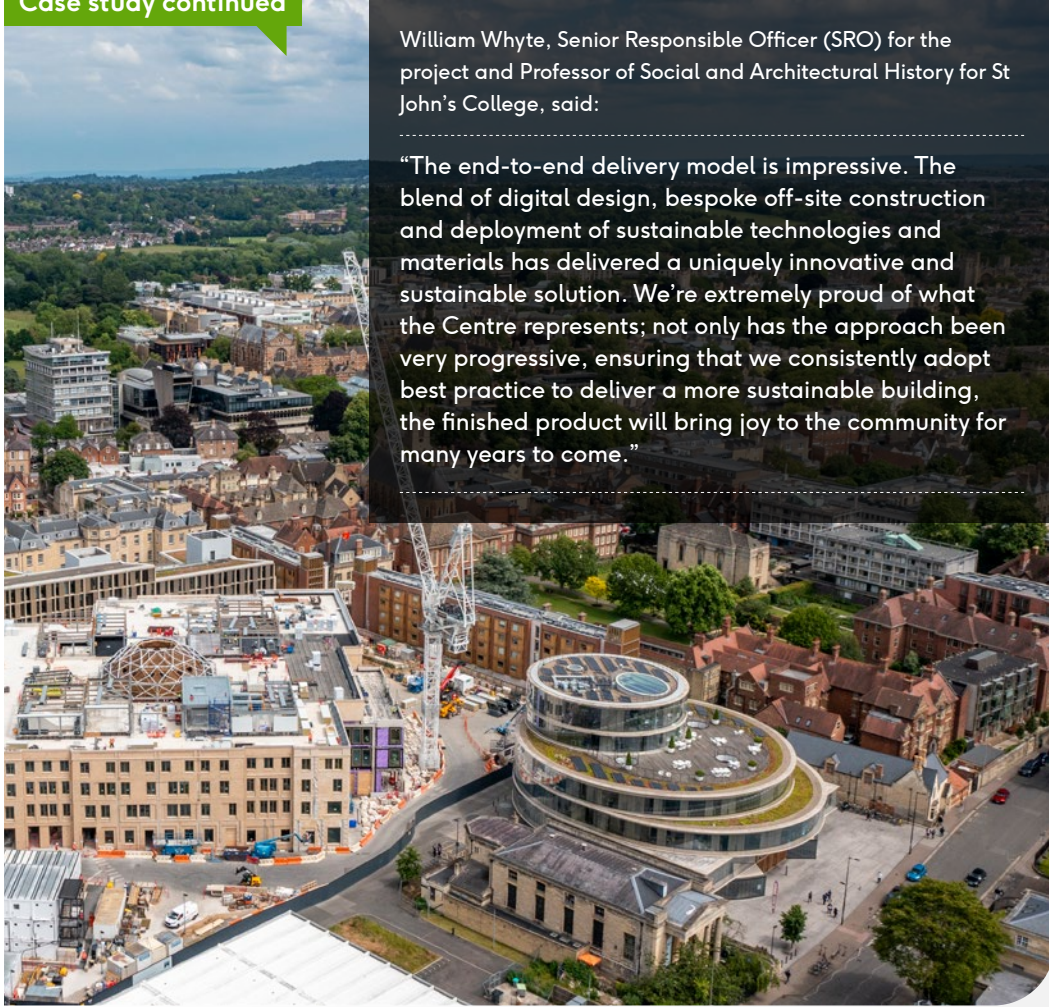
-  Passivhaus typically reduces heating demand by **90%**
-  Low carbon concrete abated **544 tCO<sub>2</sub>e**, equivalent to driving a car around the Earth's circumference **97** times
-  **97.7%** recycled steel reinforcement
-  **98.4%** reduction in carbon from fuel by using HVO in place of diesel
-  **13%** Biodiversity Net Gain estimated at project completion
-  **110** hours of volunteering and community engagement
-  **166** young people benefited from educational outreach
-  **£180,000** saving through challenging timber spec and sourcing a more sustainable solution

Image: Stephen A. Schwarzman Centre for the Humanities, Oxford, UK

## Case study continued



William Whyte, Senior Responsible Officer (SRO) for the project and Professor of Social and Architectural History for St John's College, said:

“The end-to-end delivery model is impressive. The blend of digital design, bespoke off-site construction and deployment of sustainable technologies and materials has delivered a uniquely innovative and sustainable solution. We're extremely proud of what the Centre represents; not only has the approach been very progressive, ensuring that we consistently adopt best practice to deliver a more sustainable building, the finished product will bring joy to the community for many years to come.”

Innovation has been a key principle throughout the project, which truly embraces modern methods of construction. Laing O'Rourke's specialist team produced detailed digital designs up front, enabling the contractor and the client to run a variety of scenarios, producing carbon, programme and cost outcomes that were easy to compare.

Steve Holland, Laing O'Rourke's Project Director, explains:

“Our ability to do so much work offsite has been a critical part of our goal to be the 'invisible builder' in Oxford. This approach has meant we can work with a smaller on-site workforce, the number of deliveries is much lower than it would be if we were building in-situ, resulting in lower transport emissions. It also brings wellbeing benefits to people that can contribute to the project across the breadth of the country—instead of travelling to Oxford, they're able to work at a consistent workplace close to their friends and families.

That's quite a different way of working in this industry. A high level of precision is required to achieve the air-tightness required, and manufacturing off-site is also helping us to achieve that, in a controlled setting using our in-house specialists.”

**Low carbon concrete** has been used throughout the build. This move has delivered a saving of 544 tCO<sub>2</sub>e versus typical concrete mixes used in 2022. The steel used for reinforcement on the project comprises 97.7% recycled material, further reducing the building's embodied carbon.

The centrepiece of the building is a spectacular wooden dome. Laing O'Rourke's teams worked closely with supply chain partners to scrutinise and refine the timber specification to minimise environmental impact, while maintaining the visual impact of the final piece.

Changes were made to the original specification so a **far greater cross section of the log could be used, reducing timber wastage and the overall number of logs needed.** It also resulted in £180,000 of savings for the University. Across the project, a focus on **procuring materials from within the UK** has helped to reduce transport emissions and support local economies.

Mains power has been used where possible. Where it isn't, responsibly-sourced hydrotreated vegetable oil (HVO) has been used in place of diesel, delivering a 98.4% carbon reduction on fuel.

