

PROJECT Holbein Gardens

YEAR

2023

LOCATION

London, United Kingdom

USE

Office

CONSTRUCTION

Major Renovation of Existing
Structure: Vertical Expansion

ARCHITECT

Barr Gazetas

ENGINEER

Heyne Tillet Steel

DEVELOPER

Grosvenor Properties UK

BUILDER

Blenheim House Construction
(general), Eurban (CLT and
steel)

SUPPLIER

Cleveland Steel & Tubes

SPECIALISTS

GROSS AREA

24,750 sq-ft

MEAN ROOF HEIGHT

STORIES ABOVE GRADE

6

STORIES BELOW GRADE

1

RISK CATEGORY

III (buildings with a substantial
risk to cause economic impact
and/or mass disruption)

COST INFORMATION

Partially available

LCA INFORMATION

Partially available



Credit: Heyne Tillet Steel

MATERIALS

Steel

Steel

Steel

SYSTEMS

Columns, Beams

Columns, Beams

Beams

SCALE

Elemental

Elemental

Elemental

DfD

Design for
Disassembly

SCR

Structural
Component Reuse

DECON

Deconstruction

SUMMARY

Holbein Gardens was an office refurbishment and one-story vertical extension steel frame with CLT slabs. Approximately one third of the new steel was reclaimed, sourced from nearby projects or from reuse stockists.

SUSTAINABILITY GOALS

BREEAM Outstanding, WELL Platinum certification, NABERS 5 star rating.

CIRCULAR ECONOMY STRATEGIES

The team strategy focused on the use of reclaimed steel as opposed to virgin steel to form the primary structure of a lightweight vertical extension. Of the 74 metric tonnes of steel needed for the extension, 25 metric tonnes were reclaimed. Of this 25 metric tonnes, 9 tonnes of reclaimed steel was sourced from other local buildings owned by the client, and 16 metric tonnes of steel was provided by the steel stockist.

The steel reuse process followed the process outlined in Steel Construction Institute (SCI) document P427. The specification of reclaimed steel led to an estimate 45tCO₂e saving in upfront embodied carbon, and an estimated 62kgCO₂/m² embodied carbon for the structure of the vertical addition.

In addition, the new steel frame was designed with mechanical connections to facilitate future deconstruction.

KEY FINDINGS, RECOMMENDATIONS, AND LESSONS LEARNT

The reclaimed steel refabrication and stock supply was completed by Cleveland Steel & Tubes (CST), and experienced reclaimed steel party. CST completed the necessary steel sampling and material testing to confirm the steel grades before completing the refabrication work. Experienced partners who can control many of the reclaimed steel steps was beneficial for the project.

The design process using reclaimed steel was necessarily different, and the engineer was required to adjust designs to match the final available steel sizes from limited stock (using HTS' 'Stock Matcher'). The steelwork on the project was destined to be exposed in its final use, so this required stripping existing steel coatings to apply a new finish.

FURTHER INFORMATION AND RESOURCES

[https://www.istructe.org/journal/volumes/volume-101-\(2023\)/issue-3/holbein-gardens-low-carbon-reclaimed-steel/](https://www.istructe.org/journal/volumes/volume-101-(2023)/issue-3/holbein-gardens-low-carbon-reclaimed-steel/)

<https://asbp.org.uk/case-studies/holbein-gardens>

<https://globalabc.org/sustainable-materials-hub/resources/steel-reuse-incorporating-reclaimed-steel-holbein-gardens>

<https://terc.org.uk/54-2/>

<https://www.grosvenor.com/news-insights/some-of-uk%E2%80%99s-first-salvaged-steelwork-reused-in-holbein-gardens-retrofit>

<https://www.ukgbc.org/solutions/case-study-holbein-gardens/>

<https://hts.uk.com/projects/holbein-gardens/>

AVAILABLE QUANTITATIVE DATA

25 metric tonnes of steel was reclaimed, with an estimated 60tCO₂e of upfront embodied carbon savings compared to if new steelwork was specified.

ABOUT THE DATABASE

This case study has been prepared by the Structural Engineering Institute Sustainability Committee Circular Economy Work Group with the goal of sharing and promoting the excellent circular economy work that project teams are working on throughout North America and the world. Often it is hard to find information on how circular economy principles are implemented in practice; these circular economy case studies aim to better share information amongst the industry.

Some case studies have been prepared directly by a project team member, while others have been prepared based on available texts and publications. In the second case, the text descriptions are a summary of information available from other sources. These sources are referenced in the *Further information and resources* section.

While reasonable efforts have been made to ensure the information is representative and accurate, we cannot guarantee there are no errors. [Please contact the case study team](#) to provide additional information, suggest updates and amendments, or with any other questions. To submit a new case study to the database, [please use this submission form](#). Thank you!