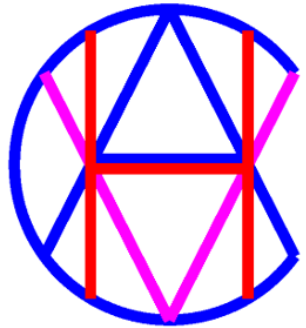


Hosted by **HOARE LEA** 



# **CIBSE HVAC Group** Celebration of Buildings & People

## 17 April 2024

At Hoare Lea,  
Western Transit Shed, 12-13 Stable Street, London N1C 4AB



**Phil Draper**  
***Twenty One Engineering***  
***CIBSE Winner:***  
***Engineer of the Year***



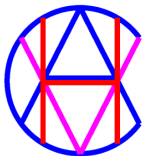
**Susie Diamond**  
***Inkling LLP***  
***CIBSE Winner:***  
***Small Consultancy***



**Eimear Moloney**  
***Hoare Lea***  
***CIBSE Winner:***  
***Large Consultancy***  
***&***  
***Residential Project***



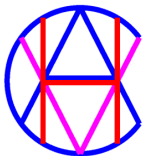
**Bart Stevens**  
***SGA Consulting***  
***CIBSE Winner:***  
***Retrofit Project***  
***&***  
***Performance Champion***





**Phil Draper,**  
***Twenty One Engineering***

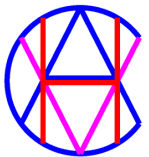
***CIBSE Winner:***  
***Engineer of the Year***





**Susie Diamond**  
***Inkling LLP***

***CIBSE Winner:***  
***Small Consultancy***



# Inkling – CIBSE Consultancy of the year\*

\*under 50 employees

---

**Susie Diamond – Inkling**

CIBSE HVAC Group

17<sup>th</sup> April 2024



# We won!



# Judges comments

In a strong category, the judges singled out Inkling as:

**‘An organisation punching well above its weight’, ‘an influential node in industry, using collaboration as a means to advocate for positive change.’**



# What makes Inkling great?



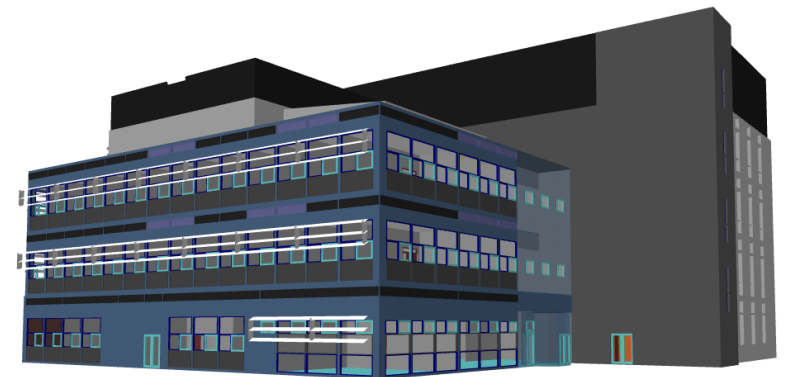


# We love what we do..

..and we are good at it

- **Dynamic thermal modelling**

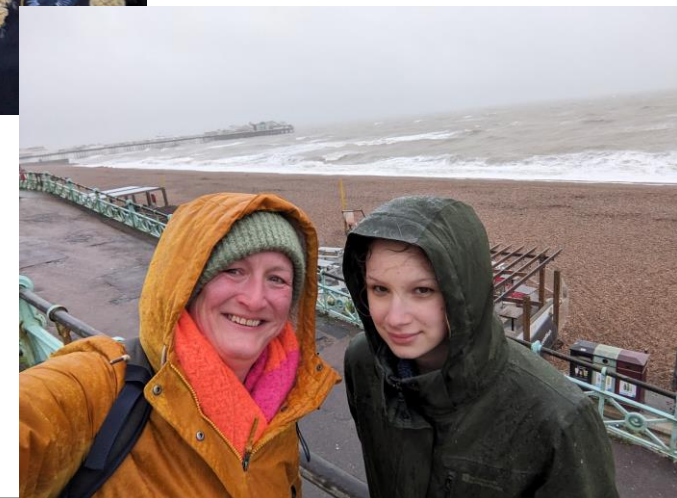
- TAS and IES
- Overheating risk assessments
- Operational Energy assessments (TM54)
- HVAC modelling
- Part O and L2A compliance modelling and advice
- BB101 for schools
- BREEAM credits
- Bespoke research
- NABERS IDR's



# We have lives outside work

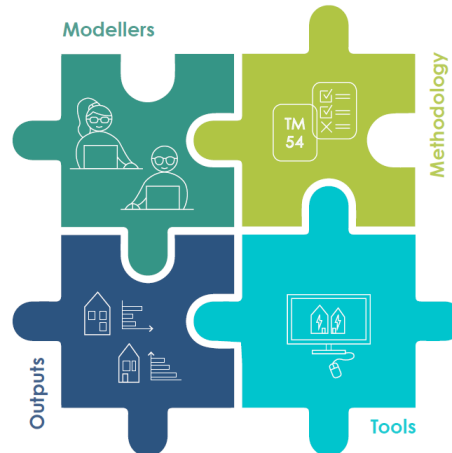


- Part-time
- Flexible working
- Home based
- No annual leave limits



# We are generous with our knowledge

- Inkling Blog
- CIBSE volunteers
  - Publications (TM59/TM54/AM11)
  - Events (Build2Perform/Symposium)
  - Groups
- LETI volunteers
  - #OMG
  - Treasurer
  - Steering group



## INKLING

Susie: 07972 263 676  
Claire: 07950 282 800  
Marcus: 020 3287 5058

What We Do Who We Are Inkling News Testimonials Contact Us

Search

### Winners!!



We are thrilled to have won Consultancy of the year (up to 50 employees) at the CIBSE Building Performance Awards 2024 last month. <CR> This recognition means the world to us. We are very fortunate to work with some amazing clients and collaborators (you know who you are), and we are grateful to the CIBSE!



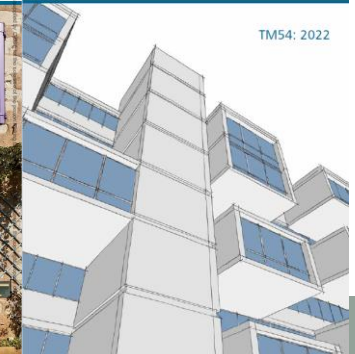
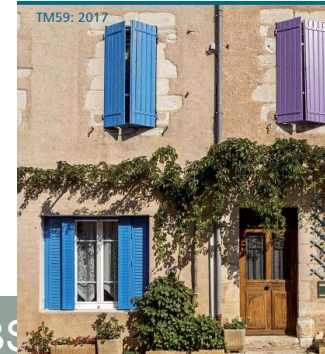
Search blogs by category:

Select Category

Design methodology for the assessment of overheating risk in homes



Evaluating operational energy use at the design stage



# We collaborate

- IMPROVE project (Carter medal winning)
- LETI
- Research & steering groups
- Delivering Net Zero

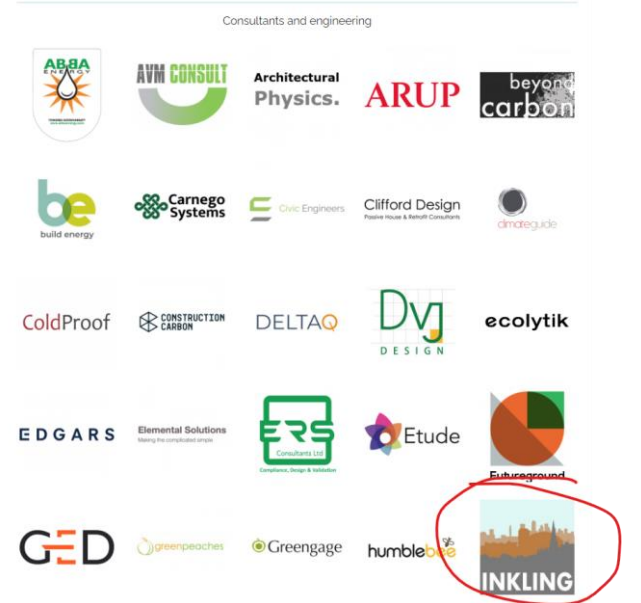


# We act on our values



As **sustainability professionals**, we commit to only work on new projects that do not propose new gas or fossil fuel heating systems.

#ENDGASNOW



# We have a distinctive identity



# Our clients appreciate us



“ If we always turn to Inking as a first choice for assessments, guidance and professional support on any project where overheating risk has to be carefully managed and thought about in early design. Whether it is a schools project, housing or a research commission we know that we will have thoughtful and

“ On today's climate, where achieving net-zero carbon buildings is paramount, Inking's work as a NABERS DfP reviewer shines through. Their deep understanding of energy modelling and building services design has provided us with detailed and invaluable guidance in our effort to de-risk designs while delivering high-quality, net-zero buildings and bridging performance gap.

Their expertise is not only necessary but also exemplary in the pursuit of sustainable built environments.

*Yorgos Koronaios*  
*Associate – Sustainable Design – Savills Earth*

*Simon Ryall*  
*Sustainability Partner – Cundall*

# We offer free biscuits



## Thank you for listening!

**Susie Diamond**

Find us at [www.inklingllp.com](http://www.inklingllp.com)

 [www.linkedin.com/company/inkling-llp](https://www.linkedin.com/company/inkling-llp)







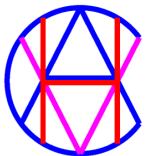
**Eimear Moloney**

***Hoare Lea***

***CIBSE Winner:***

***Large Consultancy &***

***Residential Project (Bryn Bragl)***



HOARE LEA 

# Bryn Bragl / Rhiw Cefn Gwlad.

## Energy Positive Social Housing.

EIMEAR MOLONEY

CIBSE HVAC GROUP  
17 APRIL 2024

'Winner' of the 2024 CIBSE Building  
Performance 'Residential' Project Award.





#14

'Energy positive' social homes in  
Bridgend, South Wales. Built by  
Wales & West Housing Association

x4 1-bed apartments.

x10 2-bed houses.

x2 4-bed houses.

# The Concept Design.

A housing concept developed by the Welsh School of Architecture.

The output of “Smart Operation for a Low Carbon Energy Region” (SOLCER).

Demonstration house built in 2015.



## Britain's first 'energy positive' house opens in Wales

**Powered by the sun, this low cost three-bedroom house is the first in the country to produce and sell more energy than it uses**



▶ The Solcer House at Cenin in Stormy Down, Wales, was built as part of the Low Carbon Research Institute programme. For every £100 spent on electricity used, it should be able to generate £175 in electricity exports. Photograph: Cardiff University

HOARE LEA  The Solcer Design Concept



# Specification Summary.

- 1.2kW Exhaust Air Heat Pump, integrated with MVHR (Pichler PKOM4)
- 'Top-up' duct heaters.
- No gas boilers, no radiators, no cooling.
- 1.25kW in line, direct electric, duct heater
- 400W Electric towel rails
- 13.5kWh Tesla Powerwall Battery
- 3.68 – 7.37 kWp Solar-Photovoltaics

Element	Fabric Details
Floor	0.138 W/m <sup>2</sup> K
Walls	0.122 W/m <sup>2</sup> K
Pitched roof	0.136 W/m <sup>2</sup> K
External doors	1.22 W/m <sup>2</sup> K
Windows	0.84 W/m <sup>2</sup> K
Air permeability	Target 1.2 m <sup>3</sup> /m <sup>2</sup> .hr Achieved 1.8 m <sup>3</sup> /m <sup>2</sup> .hr

# Capital Costs.

- Welsh Gov. cost guidance: **£1,800/m<sup>2</sup>**
- RCG costs over 14 homes: **£2,436/m<sup>2</sup>** (i.e. **35% cost increase**).
- Additional costs attributed to improved building fabric, integrated heat pump/ MVHR system, solar-PV & battery storage.
- Future economies of scale likely to reduce capital costs.

## Indicative cost of innovation elements

	Extra cost per home
External Frame (SIPS)	£15,700
Exhaust Air Heat Pump/ MVHR system	£15,700
Building integrated PV systems	£4,700
Battery	£5,900
Monitoring package	£850
Misc. additional contractor costs	£14,300
<b>Total</b>	<b>£57,150</b>

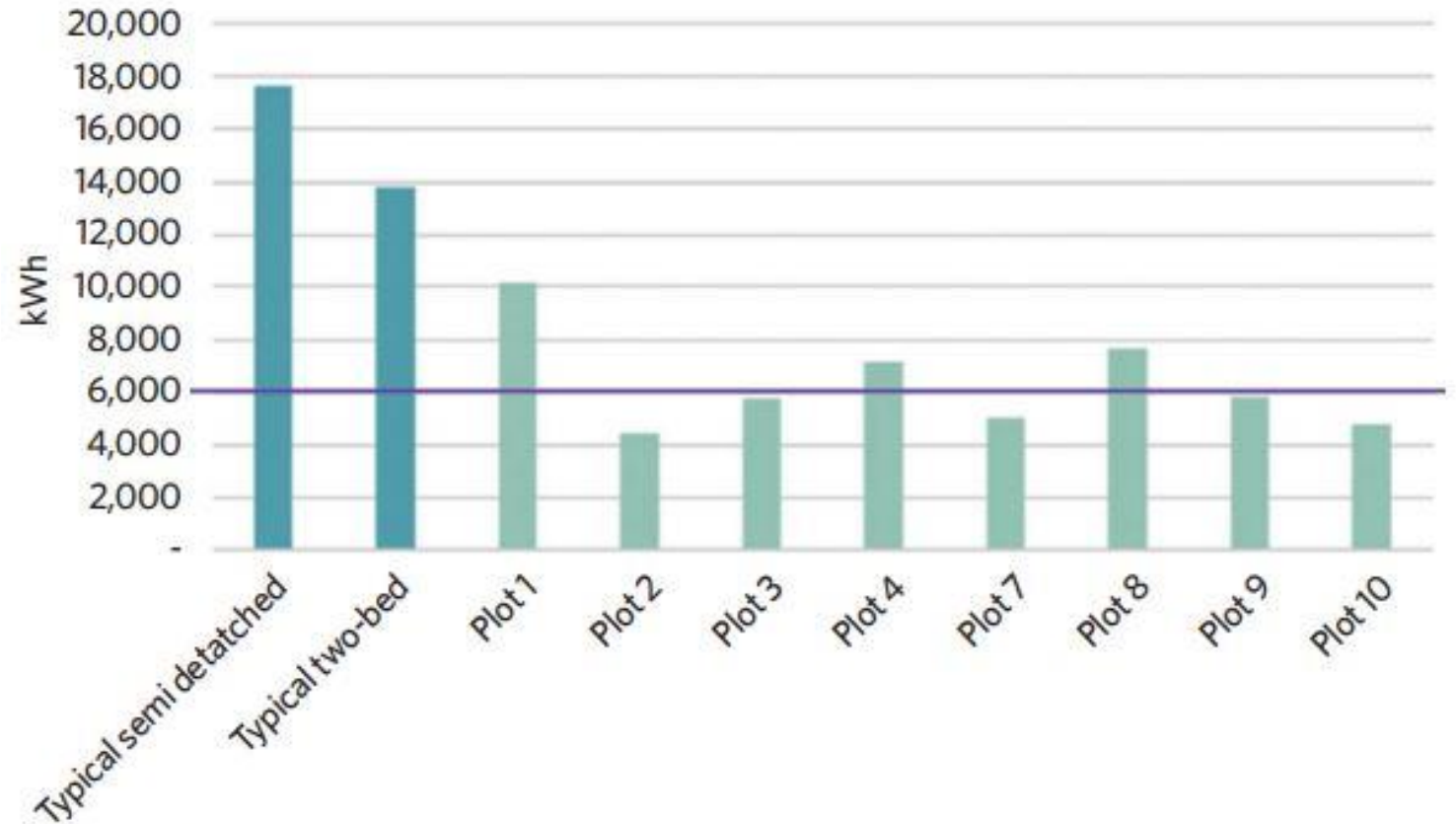






# Benefits of energy efficient/ passive design approach.

Bryn Bragl baseline energy consumption is, on average, less than half typical practice benchmarks. (Some variation is due to different occupancy/ operation patterns).

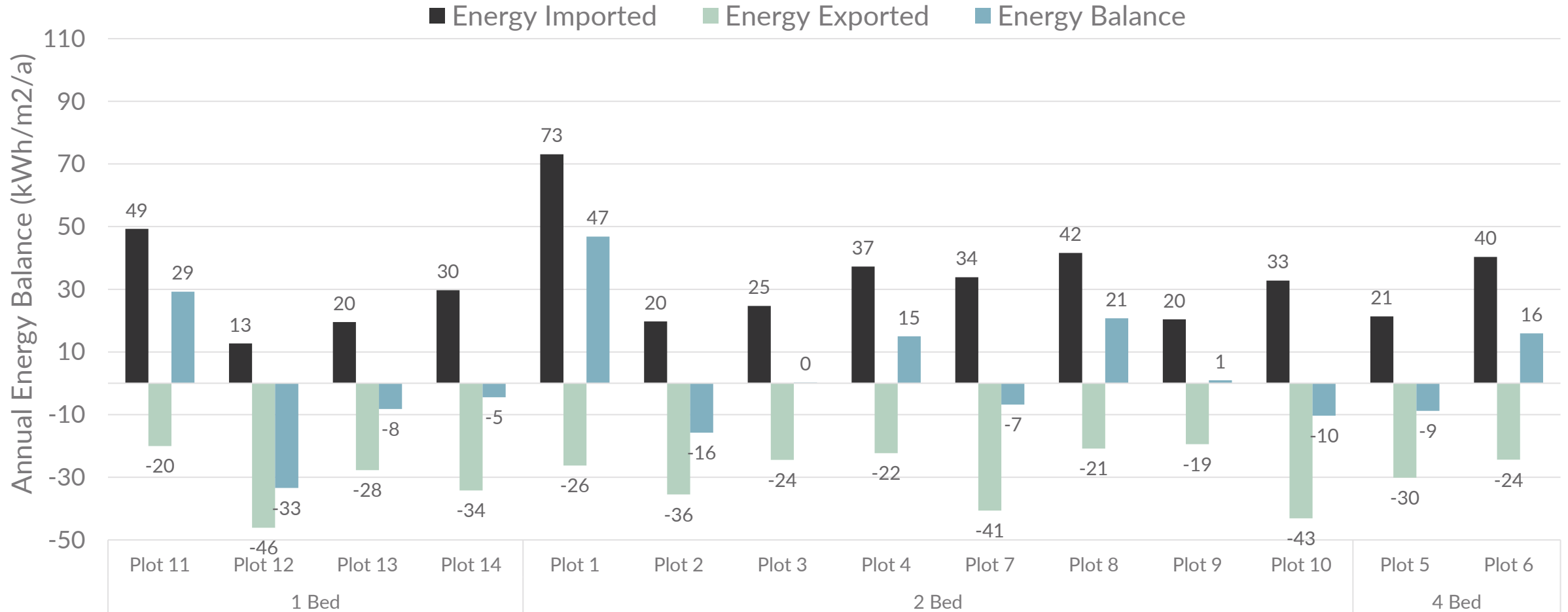


# The Energy Performance - Insights.

- All houses performed better than the RIBA baseline
- Four houses better than RIBA 2025 target
- ~70% of energy uses are unregulated loads, lighting, towel rails and cooking.
- Ventilation, heating and hot water ~ 30%
- 400W towel rails initially using a lot of energy but 2-hr timer modification reduce consumption, which was liked by the occupants.



# The Annual Energy Balance (kWh/m<sup>2</sup> per year).



# The Annual Energy Balance (kWh/m<sup>2</sup> per year) Insights.

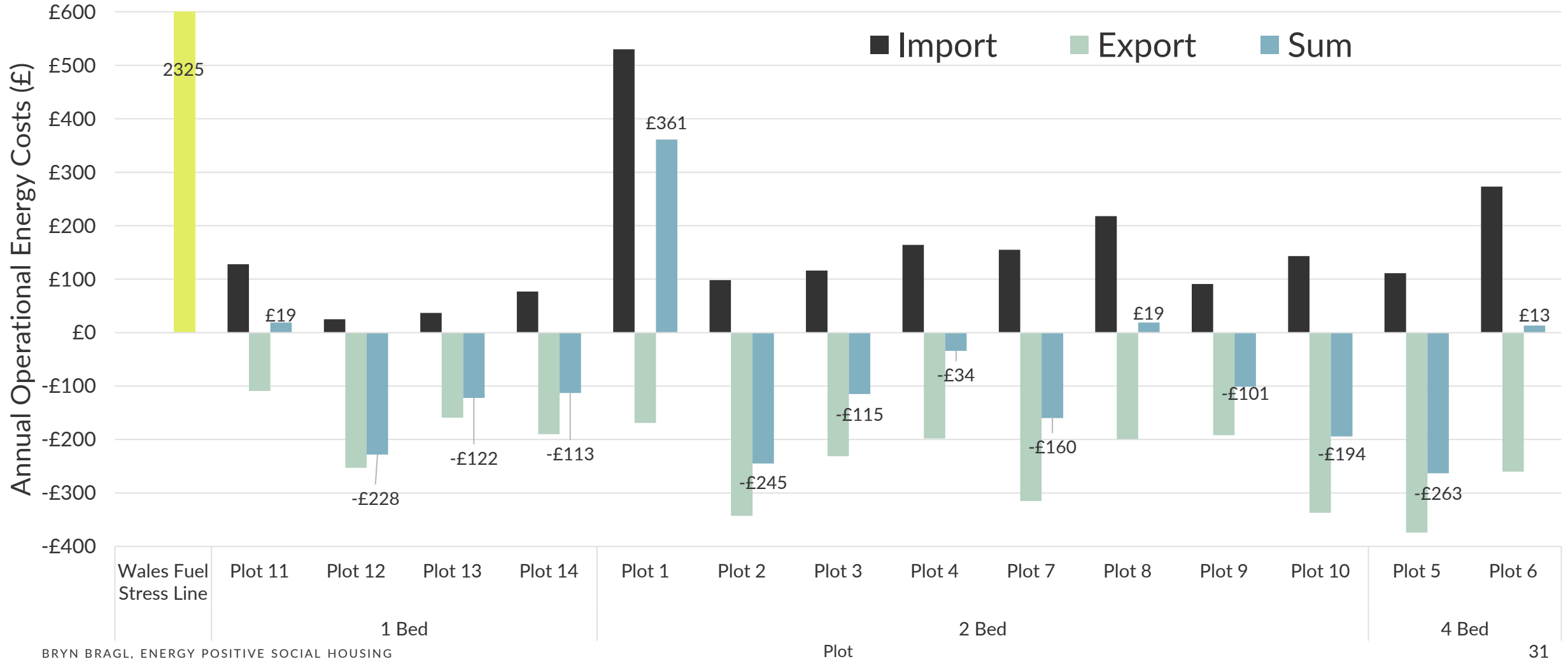
- **Seven** were energy positive over the year, i.e. generated more than they consumed.
- **Seven** of the houses were energy negative over the year, i.e. consumed more than they generated.
- Unregulated loads has the most significant effect on the disparity of energy consumption.
- Comfort set point variations from 19°C to 25 °C

# Some Observations on Energy Utilisation

- Significant differences in heating and hot water set-points influence energy variability.
- One house has a hydrotherapy pool
- Electricity demand was higher than expected. Potentially due to duct heaters & set-points.
- Some controls and operational fixes were made after handover, as a result of monitoring performance.
- A monitoring screen helped residents understand energy use.



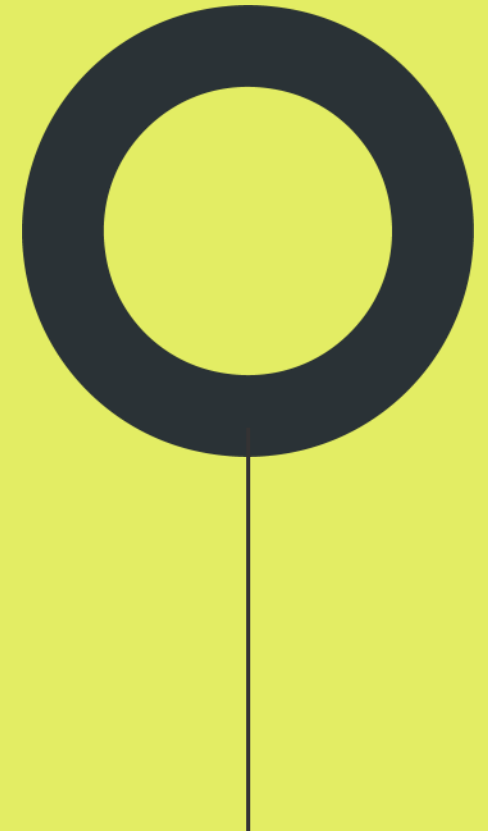
# The Annual Energy Cost Balance (£/year)



## Occupant Feedback.

*“The systems built into the house are really easy to use. The house is so well insulated that the temperature hardly drops below 20 degrees. Even on some of the coldest days in winter we didn’t need to put the heating on”*

RESIDENT AT BRYN BRAGL





# Cost Benefit of Energy Positive Homes

Average annual  
energy bill in  
credit by:

**+£83**

*“We have built up more than £250 in credit during the summer [due to the solar power generation]. ...The extra money we are saving in our household has allowed us to spend more on healthy, fresh food and save for our children’s school uniforms and special occasions.”*



# Occupant Feedback.

*“The battery is fantastic. It stores the electricity from the roof for when we need it. I also have an app on my phone so that I can control the heating and hot water when I am away from home to save even more energy.”*

*“We are paying just £20 a month for our electric bills and are in credit on our bills, which is amazing. The house is perfect.”*

RESIDENTS AT BRYN BRAGL

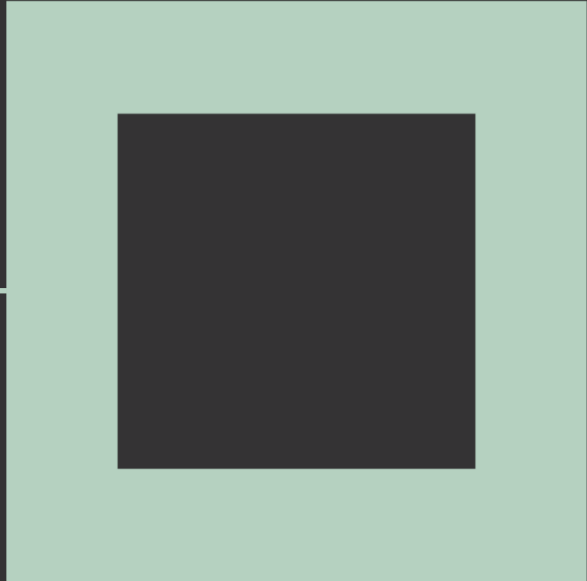


# Conclusion.

## Lessons for Net Zero Carbon Development.

1. Energy positive buildings are viable with three key features:
  - Very low energy/ passive design.
  - Sufficient on-site renewable generation.
  - Energy storage and smart controls.
2. Demonstration projects provide useful case studies for learning and knowledge sharing.
3. The role of the occupant will become increasingly important as user behaviour influences appliance operation and optimisation of controls.



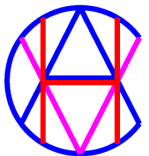


**Thank you.**  
**hoarelea.com**

**Any Questions?**



**Bart Stevens**  
***SGA Consulting***  
***CIBSE Winner:***  
***Retrofit Project (York Guildhall) &***  
***Performance Champion***



# YORK GUILDHALL REFURBISHMENT



**BURRELL | FOLEY | FISCHER**  
ARCHITECTS AND URBAN DESIGNERS



**ARUP**

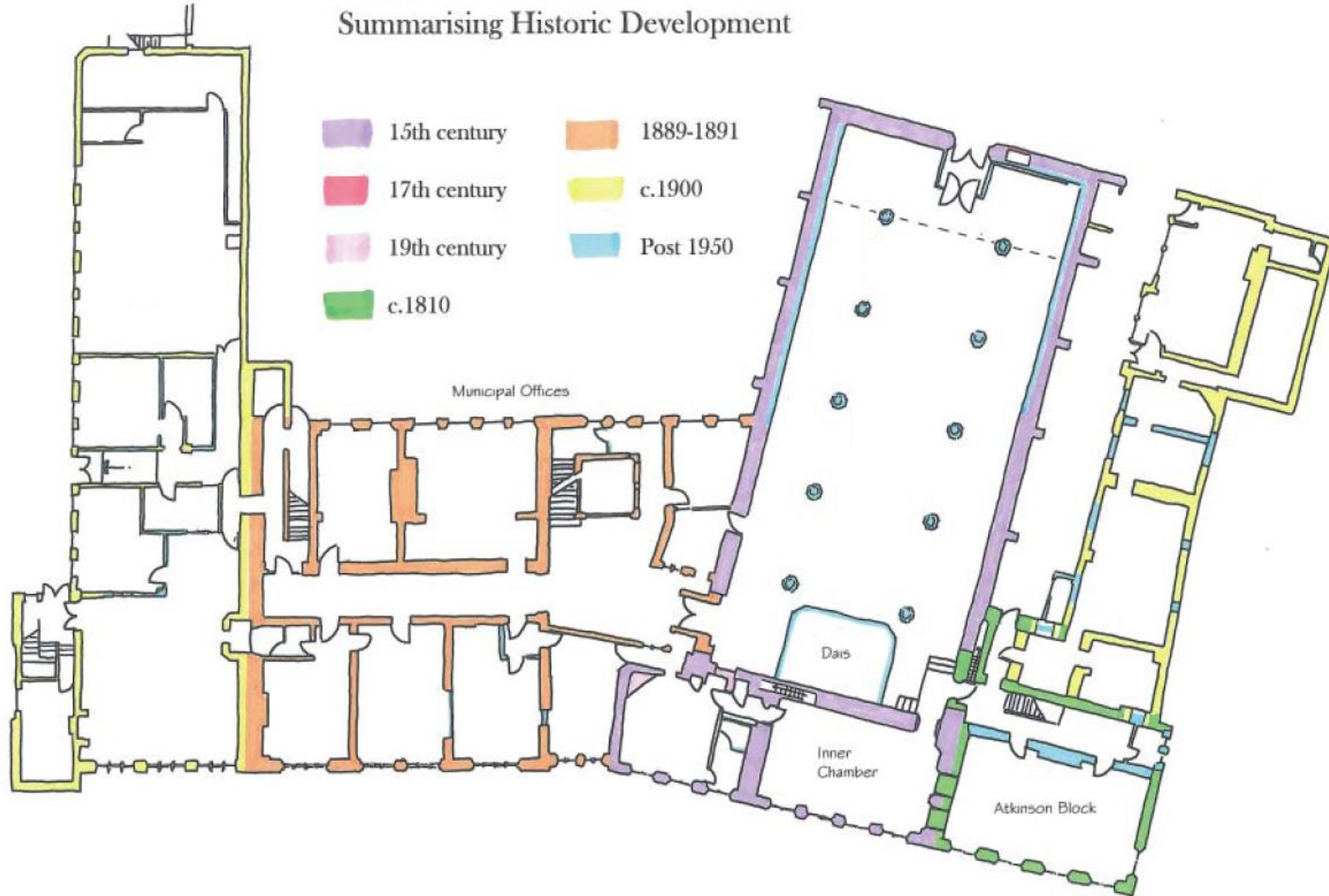


# BUILDING LISTING

## YORK GUILDHALL

Ground Floor Plan

Summarising Historic Development



# SITE LAYOUT





# INTERIORS



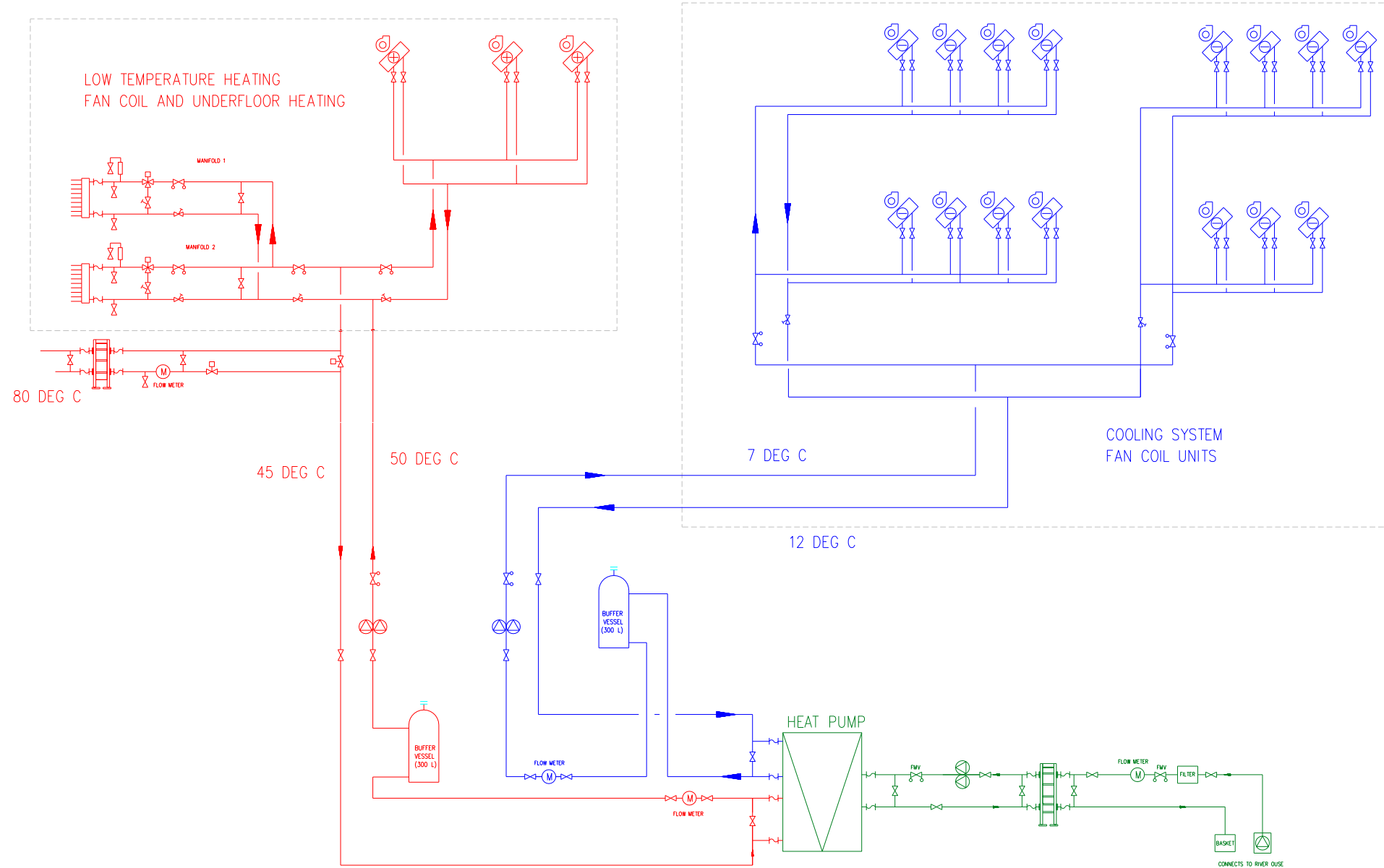
# INSULATION



## HEAT PUMP



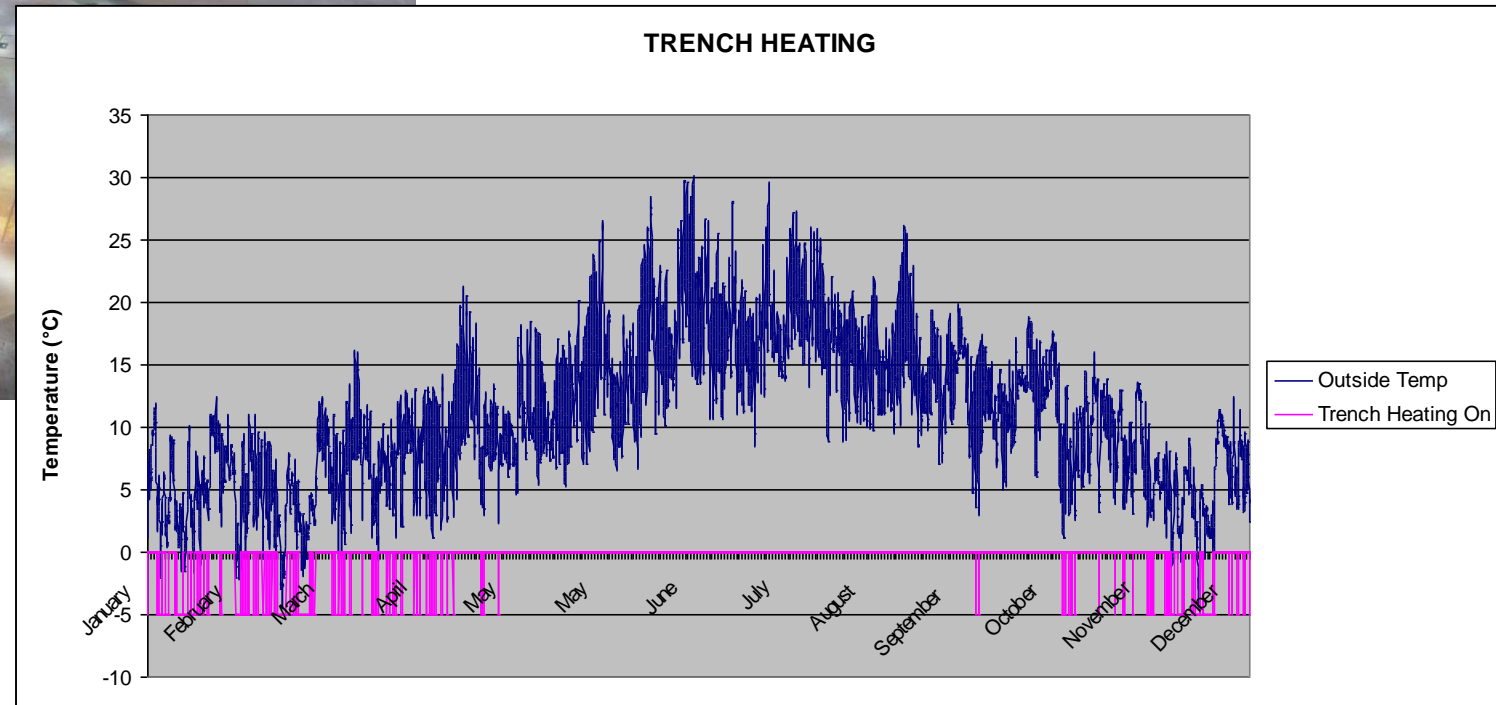
# HEAT PUMP SCHEMATIC



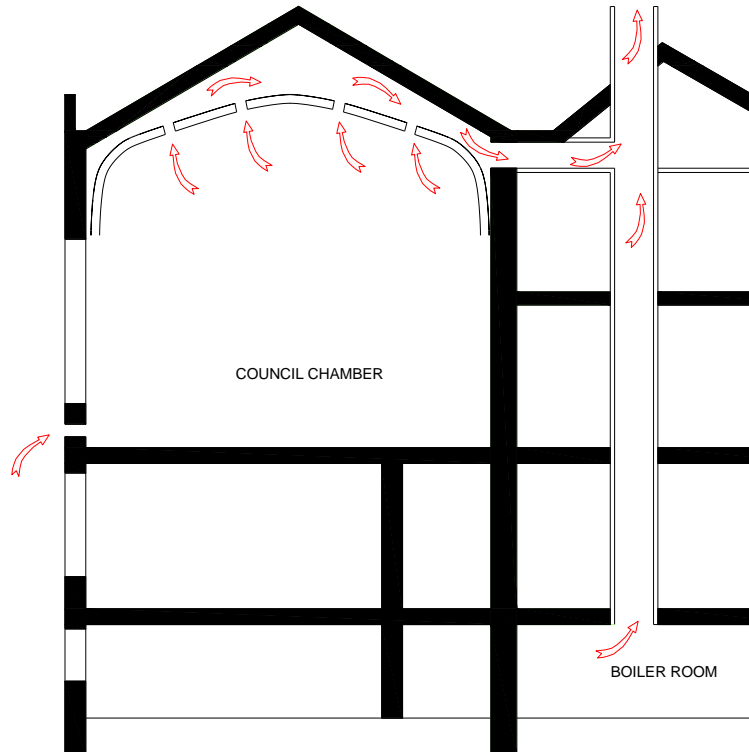
# HEATING AND COOLING



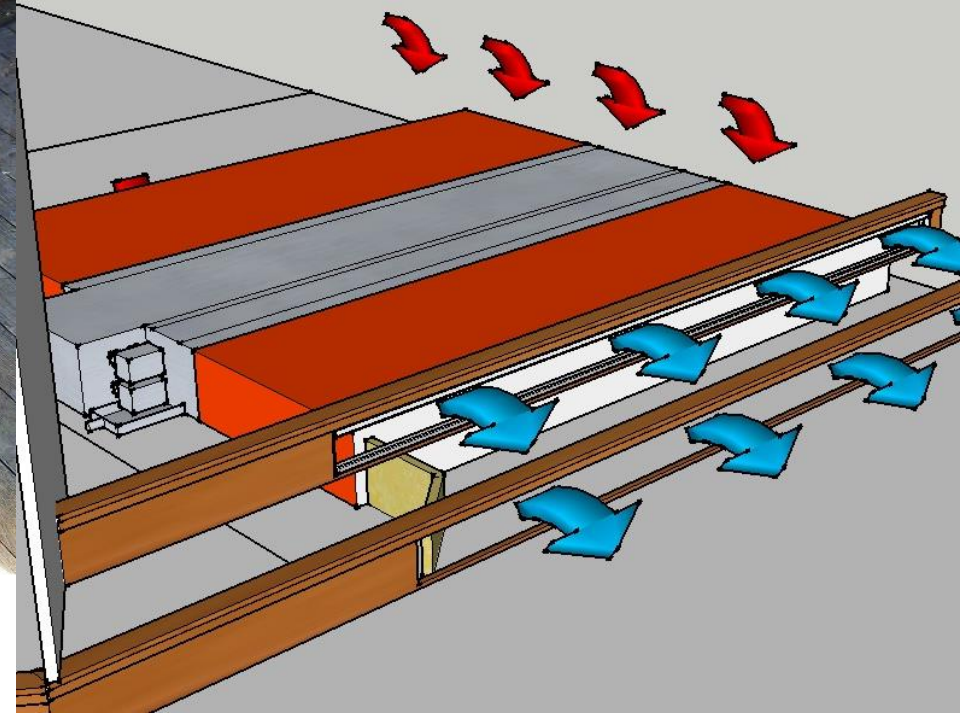
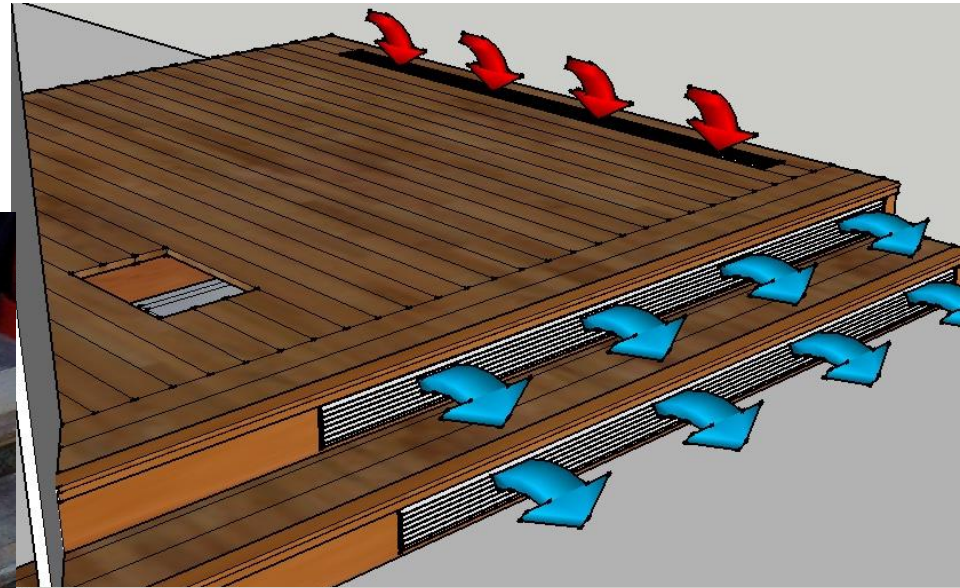
# GUILDHALL HEATING



# COUNCIL CHAMBER VENTILATION

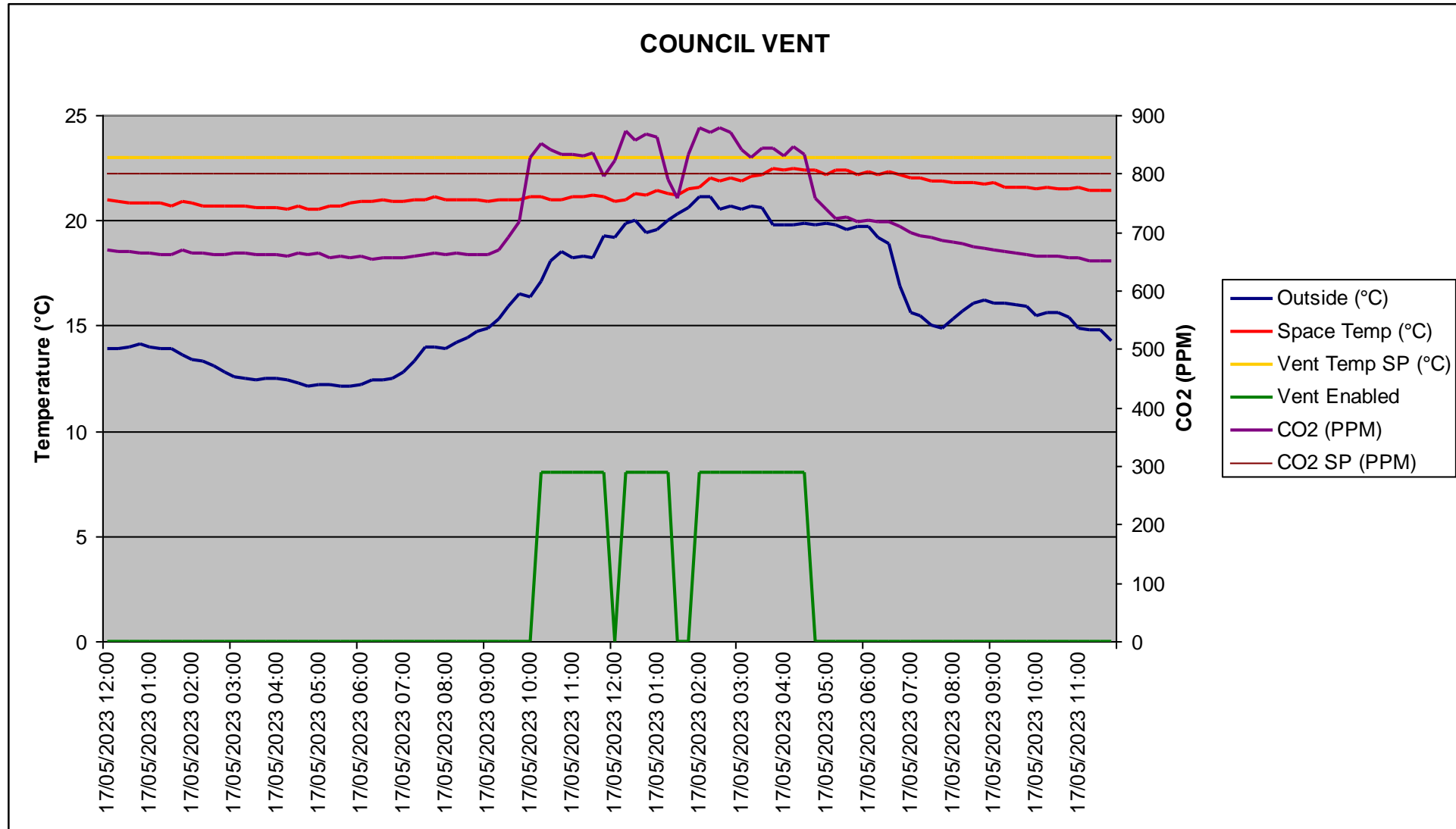


# COUNCIL CHAMBER COOLING

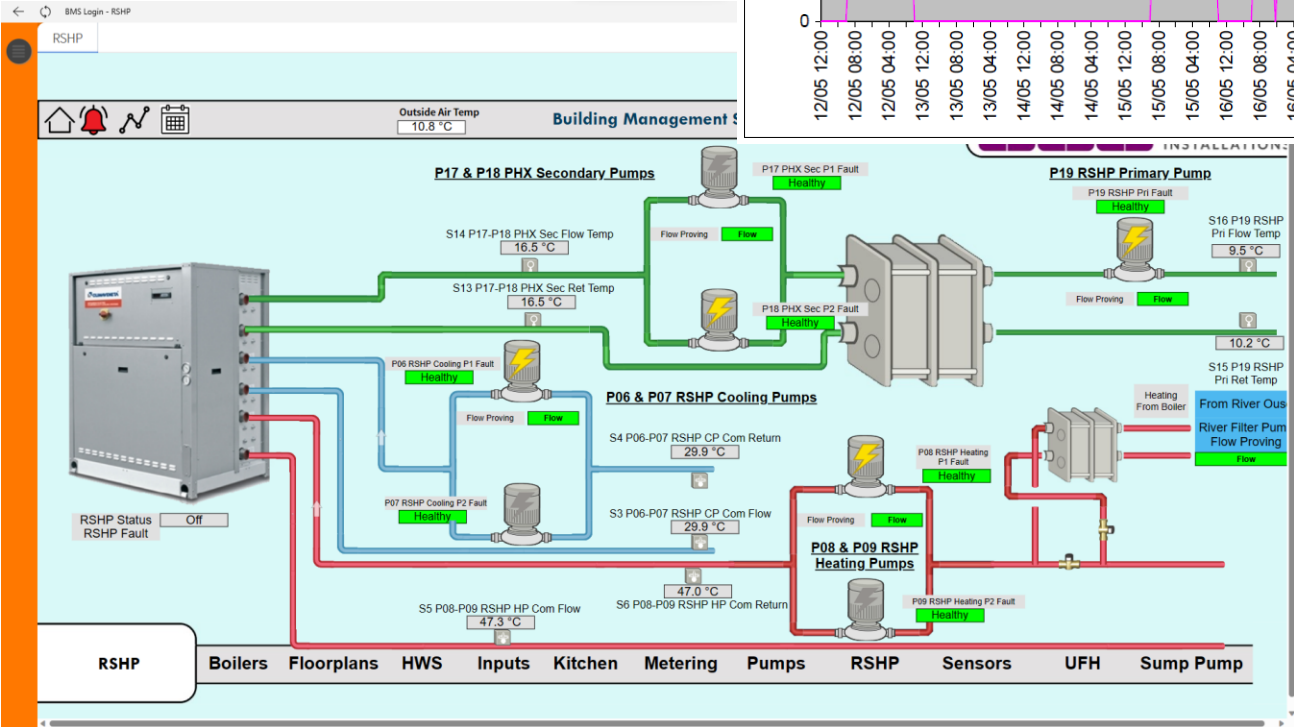
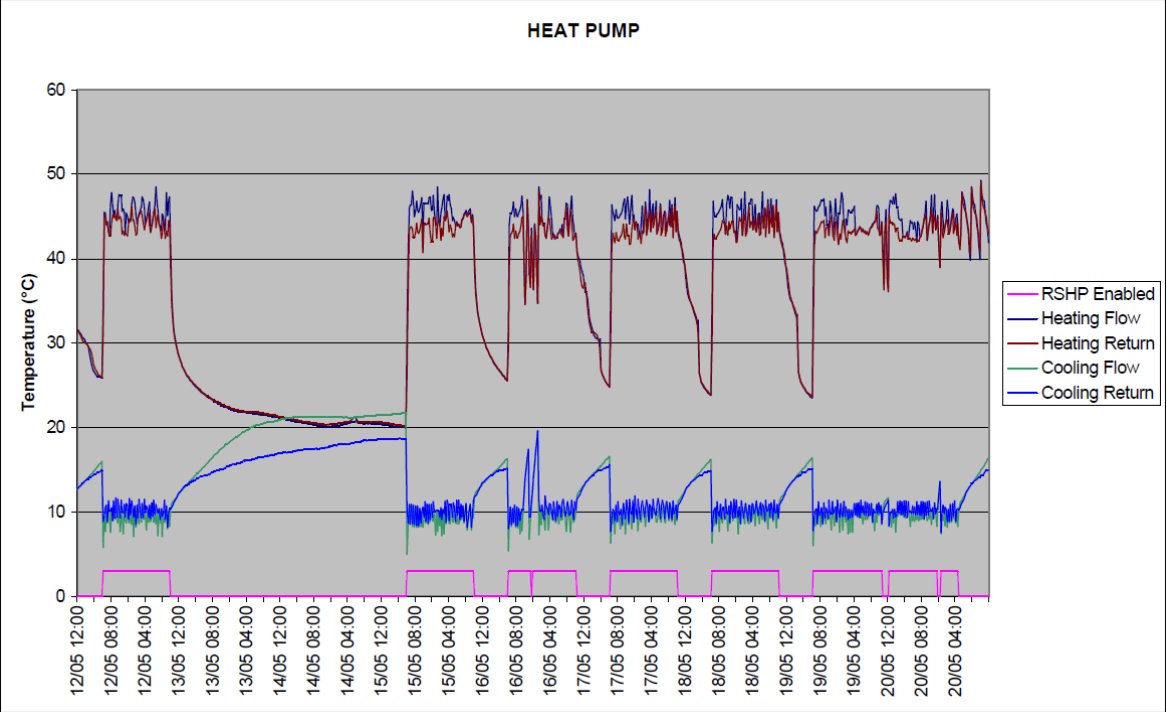




# DOES IT WORK?



# SOFT LANDINGS



## SOFT LANDINGS - ISSUES FOUND

Keep guildhall underfloor heating off on cool days in summer because of long time lag of space

Turn hot water off over weekends if not needed

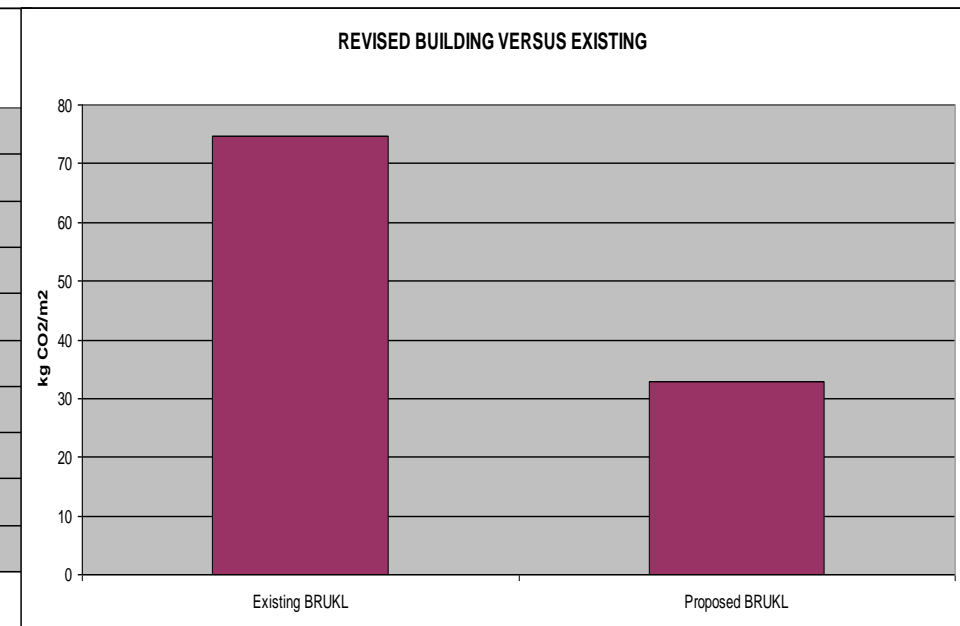
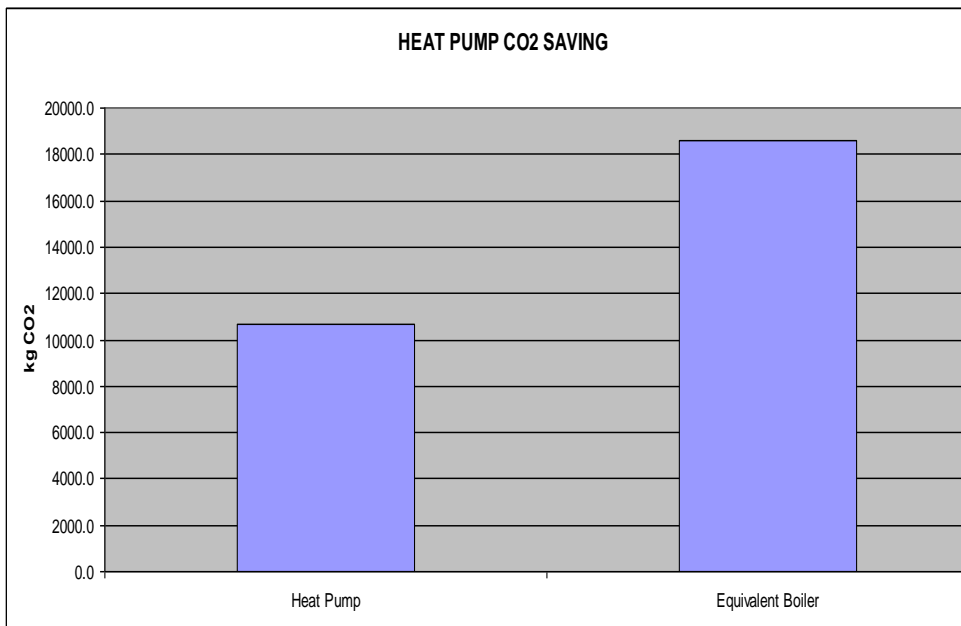
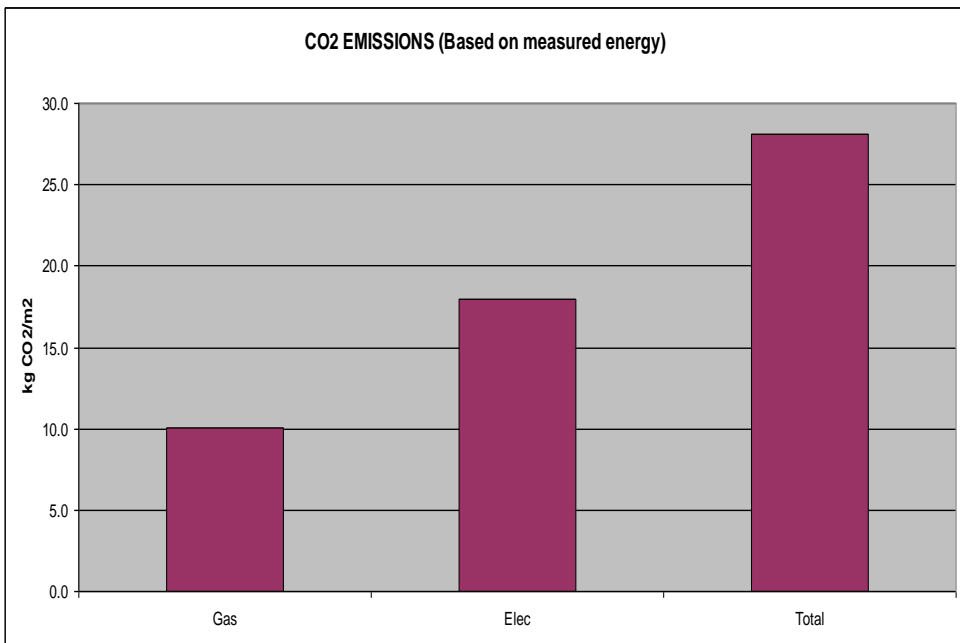
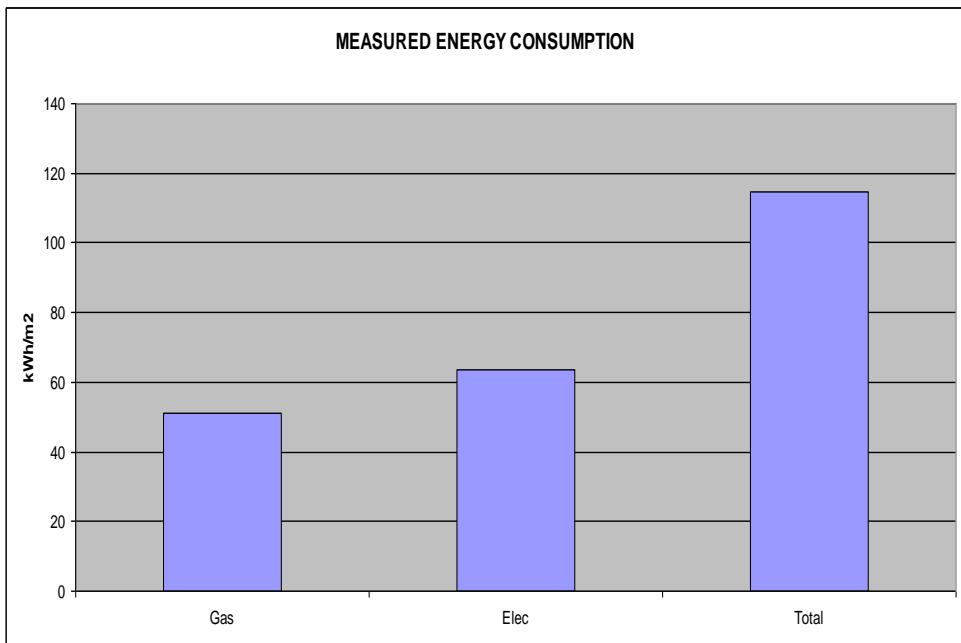
Adjust CO2 set points in guildhall if needed

Lower vent set point in slype to keep it cooler

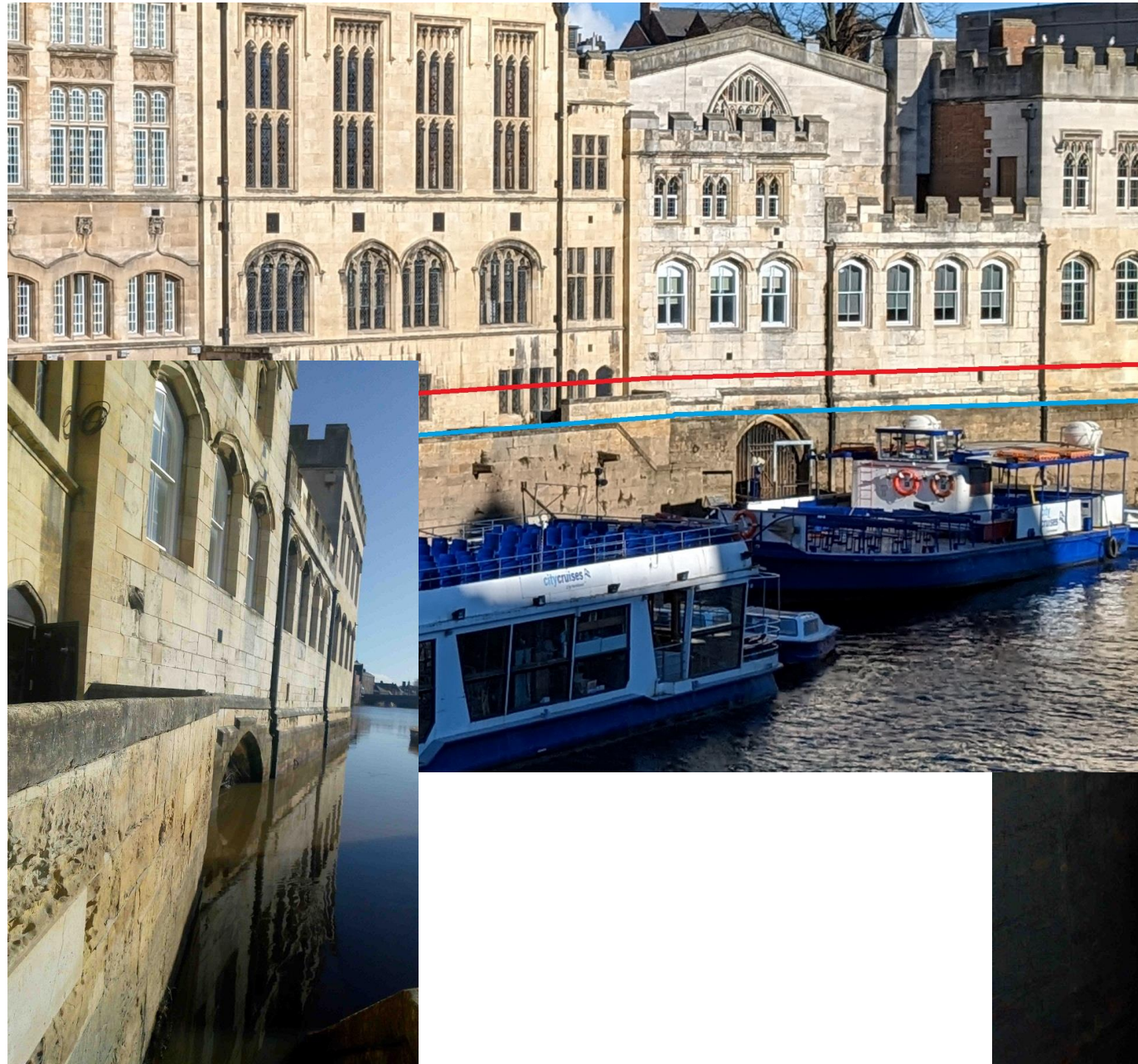
Client not aware of 2-speed control of kitchen ventilation



# ENERGY CONSUMPTION AND CO2



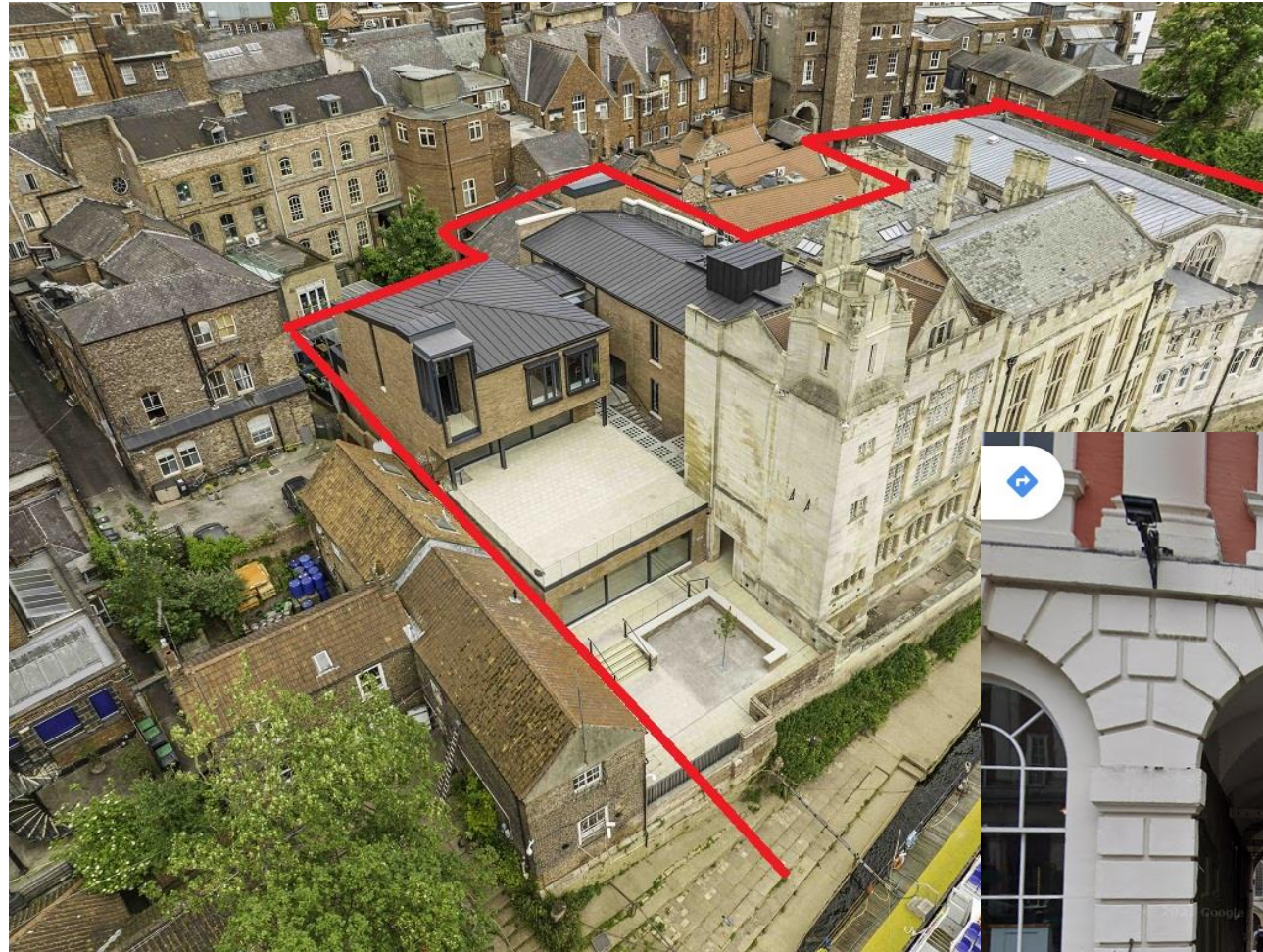
# RIVER FLOODING



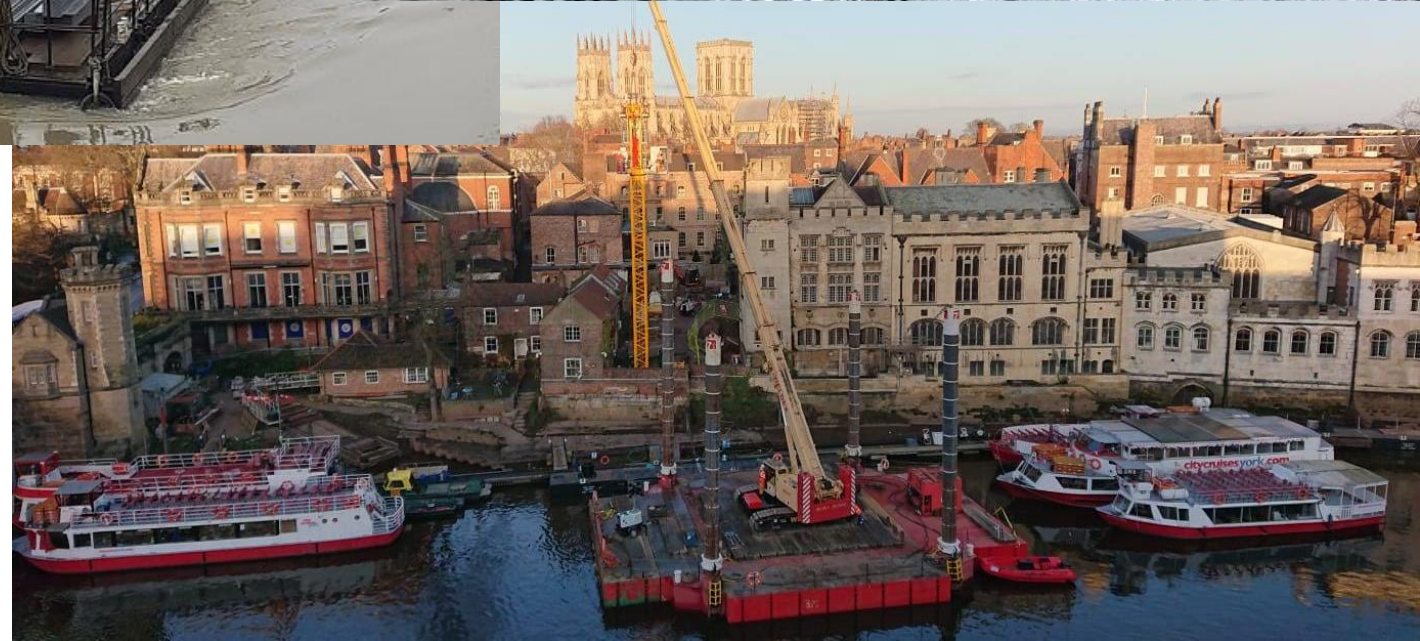
# FLOOD LEVEL



# SITE ACCESS



# RIVER LOGISTICS







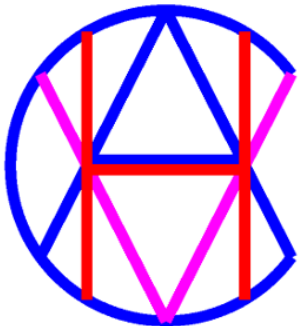
# CIBSE HVAC Group.

## Thank you!

Email: [hvacsystems@cibse.org](mailto:hvacsystems@cibse.org)

Linkedin: [www.linkedin.com/company/cibse-hvac-systems-group](http://www.linkedin.com/company/cibse-hvac-systems-group)

Web: [www.cibse.org/networks/groups/HVAC-Systems](http://www.cibse.org/networks/groups/HVAC-Systems)



17<sup>th</sup> April