EnerPHit

Grosvenor Britain and Ireland EnerPHit Projects

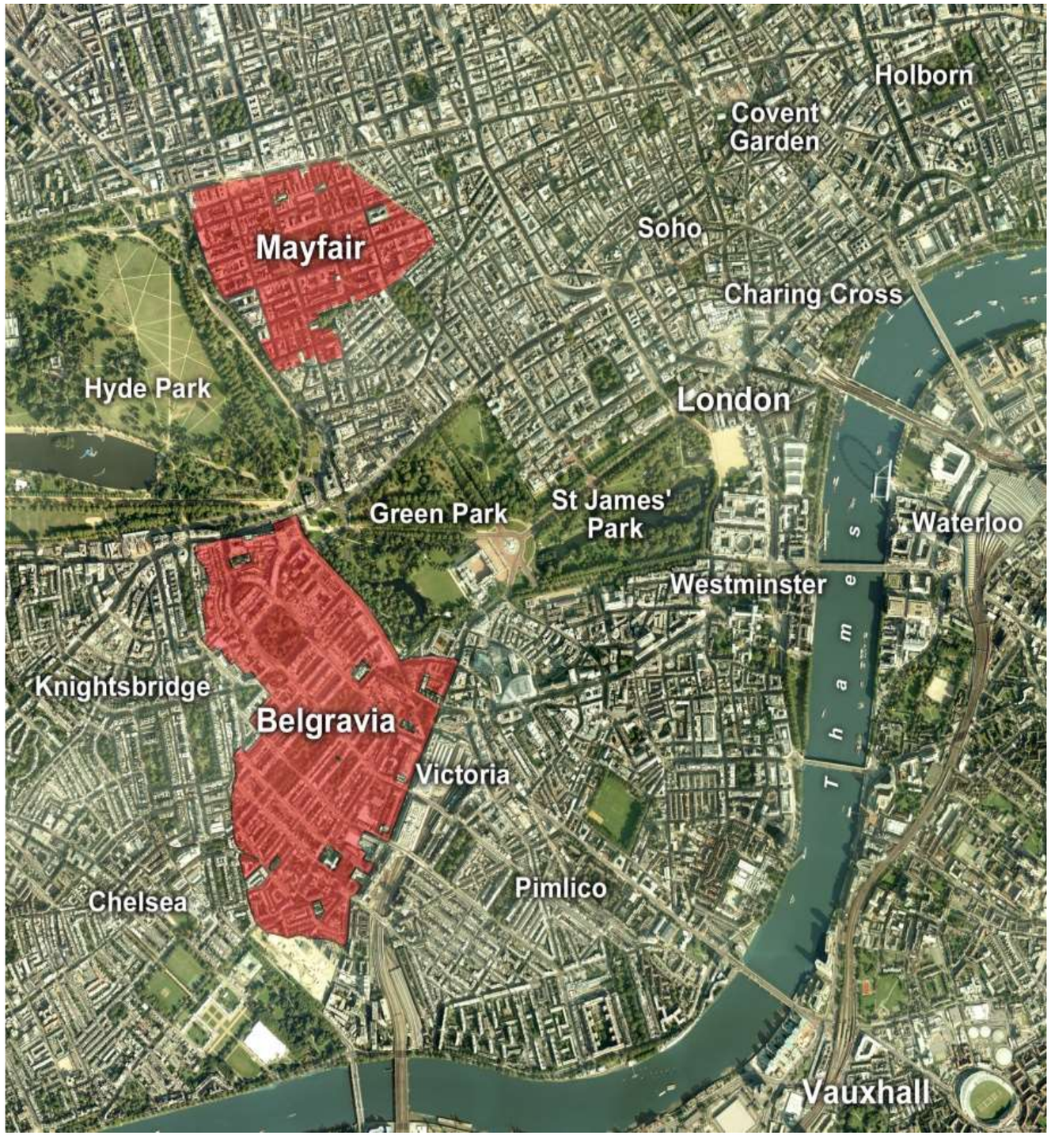
Mike Levey behalf of

Maiia Williams (nee Guermanova) behalf of

Introduction

Introduction

Grosvenor Britain and Ireland



GROSVENOR

One of the largest private estates in Central London with 6,500+ properties, of which:

- 90% in Conservation Area that have protected facades - like for like window replacements, and
- 20% Listed Properties (Statutory List of Buildings of Buildings of Specialist Historic and Conservation Interest) that have protected facades, windows and interiors also.

Carbon saving targets **38% carbon reductions for 2024**

GROSVENOR sturgis carbon profiling™

Case Study 1 – 11/19 Passmore St

1st Privately Rented EnerPHit Home (2-bed terrace)

GROSVENOR

sturgis carbon profiling™

Case Study 1 – 11/19 Passmore St

1st Privately Rented EnerPHit Home (2-bed terrace)

GROSVENOR sturgis carbon profiling™

Case Study 1 – 11/19 Passmore St

1st Privately Rented EnerPHit Home (2-bed terrace)

GROSVENOR

sturgis carbon profiling™

Case Study 2 – 13 Adams Row

EnerPHit of 1720s Old Stable (3-bed Mews House)

GROSVENOR

sturgis carbon profiling™

Case Study 2 – 13 Adams Row

EnerPHit of 1720s Old Stable Home (3-bed Mews House)

GROSVENOR

sturgis carbon profiling™

Case Study 2 – 13 Adams Row

EnerPHit of 1720s Old Stable House (3-bed Mews House)

GROSVENOR

sturgis carbon profiling™

Case Study 2 – 13 Adams Row

EnerPHit of 1720s Old Stable House (3-bed Mews House)

GROSVENOR sturgis carbon profiling™

Case Study 3 – 29/31 St Barnabas St

Current project on site (2-bed terrace) - due to complete in Dec 2015

GROSVENOR sturgis carbon profiling™

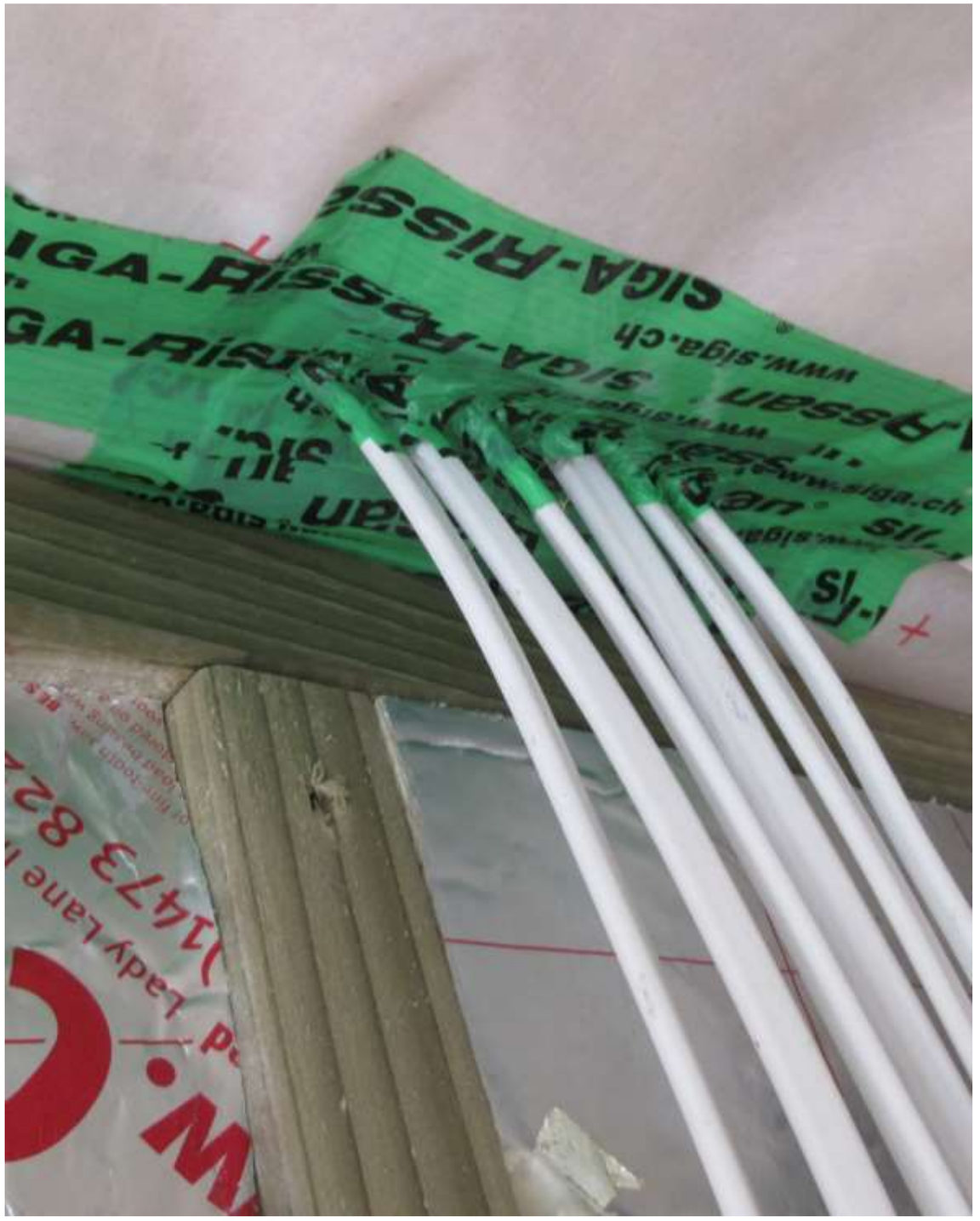
Case Study 3 – 29/31 St Barnabas St

Current project on site (2-bed terrace) - due to complete in Dec 2015

GROSVENOR sturgis carbon profiling™

Case Study 3 – 29/31 St Barnabas St

Current project on site (2-bed terrace) - due to complete in Dec 2015



GROSVENOR sturgis carbon profiling™

Case Study 3 – 40/42/44 Pimlico Road

6no. flats & 2no. Retail units (due to start in 2016)

Front existing

Proposed massing model

GROSVENOR

sturgis carbon profiling™

Case Study N…

What is next?

GROSVENOR

sturgis carbon profiling™

Technical Challenges

Technical Challenges

Existing – Poor Condition & Moisture Problems

Mould on internal walls

Rear façade with Crittal steel windows

Rear façade retained after demolition of extension

GROSVENOR

sturgis carbon profiling™

Technical Challenges

Strip-out and Structural Work - Extensive

Concrete elbow ties

Foamglas cellular glass insulation to steel beams

Engineered posi-joist floors

GROSVENOR sturgis carbon profiling™

Technical Challenges

External work – complicated if 2nd contractor used

External insulation applied to the whole street

Insulation over window frame

Insulated cill

GROSVENOR sturgis carbon profiling™

Technical Challenges

External Work – Conservation Detailing Replicated

GROSVENOR sturgis carbon profiling™

Technical Challenges

Artightness – Render Failed, Membrane Used Instead

Airtightness tape over window frame

Airtightness tape between membrane and steel

Continuous airtight intelligent membrane

GROSVENOR sturgis carbon profiling™

Technical Challenges

Internal Insulation – Low K-value to Save Space

Aerogel breathable super-efficient insulation

Kingspan insulated plasterboard to party walls

Kingspan in new party walls (foam insulation to all gaps)

GROSVENOR sturgis carbon profiling™

Technical Challenges

Insulation – Use Plastic Fixings Instead of Metal

Acoustic insulation

Aerogel breathable super-efficient insulation

Kingspan in extension and party walls

GROSVENOR sturgis carbon profiling™

Technical Challenges

M&E services – Keep It Simple!

High-efficiency MVHR from Paul + insulated ducts

Controls are kept simple, i.e. one boost button for MVHR

High-efficiency boiler from Vaillant + insulated DHW pipework

GROSVENOR sturgis carbon profiling™

Technical Challenges

Conservation & Planning Solution - Mock sashes

Thicker meeting rail

Cold bridging through aluminium spacers

Opens inwards like a casement

GROSVENOR sturgis carbon profiling™

Technical Challenges

Conservation & Planning Solution - Secondary Glazing

Keep existing sash window, if possible

Taped to become airtight

Compacfoam instead of timber support

GROSVENOR sturgis carbon profiling™

Technical Challenges

Conservation & Planning Solution - Lobby doors

Existing front door

Airtight front door – not possible

Triple-glazed lobby door used

GROSVENOR sturgis carbon profiling™

Technical Challenges

PH Certified Windows – Poor Installation and/or Quality

Casement mechanism full of site dirt/ plaster

Patio door missing a seal

Incorrectly installed mechanism

GROSVENOR sturgis carbon profiling™

Technical Challenges

Windows & doors – very heavy!

GROSVENOR sturgis carbon profiling™

Technical Challenges

Windows & doors – certification method!

Certificate

Certification by:
Cocreate Consulting,
20 Dalston Lane,
London E8 3AZ
UK

Authorised by:
Passive House Institute
Dr. Wolfgang Feist
Rheinstraße 44/46
64283 Darmstadt, Germany

Certificate ID:
10605_Cocreate_EP_20150324_WS

Cocreate Consulting hereby awards the EnerPHit certificate to the following building:

11 Passmore Street, Belgravia, London, SW1W 8HR

EnerPHit Certified Retrofit Passive House Institute

Client:	**Grosvenor** 70 Grosvenor Street London W1K 3JP UK
Architecture:	**Sturgis Carbon Profiling** Unit 20 Perseverance Works Kingsland Rd London E2 8DD UK
Building Services:	**Edward Pearce Consulting Engineers** 35 Ewell Road Surbiton KT6 6AF UK

This building was designed to meet the Passive House component energy retrofit criteria as defined by the Passive House Institute Darmstadt. Given appropriate on-site implementation, this building has the following characteristics:

Building characteristics:	Achieved	Required	
Annual specific space heating demand	23.0 kWh/(m²a)	≤ 25 kWh/(m²a)	✓
Annual specific primary energy demand[2] for heating, DHW, ventilation and all other electric appliances for standard use	127 kWh/(m²a)	≤ 130 kWh/(m²a)	✓
Airtightness of building envelope n_{50} as per test result	0.80 h⁻¹	≤ 1.0 h⁻¹	✓
Mean value of individual building component thermal protection :			
Exterior insulation to ambient Thermal transmittance (U-value)	0.12 W/(m²K)	≤ 0.15 W/(m²K)	-[1]
Exterior insulation to ground[2] Thermal transmittance (U-value)	- W/(m²K)	≤ - W/(m²K)	-[1]
Interior insulation to ambient Thermal transmittance (U-value)	0.19 W/(m²K)	≤ 0.35 W/(m²K)	-[1]
Interior insulation to ground Thermal transmittance (U-value)	0.14 W/(m²K)	≤ 0.61 W/(m²K)	-[1]
Thermal bridges Δ_U Building envelope (window installation excluded)	0.00 W/(m²K)	No limiting value	
Windows Thermal transmittance $U_{w,installed}$	0.90 W/(m²K)	≤ 0.85 W/(m²K)	-[1]
Exterior doors Thermal transmittance $U_{w,installed}$	- W/(m²K)	≤ 0.80 W/(m²K)	-[1]
Ventilation unit Effective efficiency of heat recovery	86 %	≥ 75 %	-[1]

[1] Limiting value is not relevant

Certification criteria met? Selection of the evalulation method	**Space heating demand**	✓
	Component quality	

Certifier:

William South, London, February 2015

Certificate

Certification by:
Cocreate Consulting,
20 Dalston Lane,
London E8 3AZ
UK

Authorised by:
Passive House Institute
Dr. Wolfgang Feist
Rheinstraße 44/46
64283 Darmstadt, Germany

Certificate ID:
11250_Cocreate_EP_20150618_WS

Cocreate Consulting hereby awards the EnerPHit certificate to the following building:

13 Adams Row, Mayfair, London, W1K 2LA

EnerPHit Certified Retrofit Passive House Institute

Client:	**Grosvenor Britain & Ireland** 70 Grosvenor Street London W1K 3JP UK
Architecture:	**Sturgis Carbon Profiling** Unit 20 Perseverance Works Kingsland Rd London E2 8DD UK
Building Services:	Subcontractor design

This building was designed to meet the Passive House component energy retrofit criteria as defined by the Passive House Institute Darmstadt. Given appropriate on-site implementation, this building has the following characteristics:

Building characteristics:	Achieved	Required	
Annual specific space heating demand	35 kWh/(m²a)	≤ 25 kWh/(m²a)	-[1]
Annual specific primary energy demand[2] for heating, DHW, ventilation and all other electric appliances for standard use	132 kWh/(m²a)	≤ 151 kWh/(m²a)	✓
Airtightness of building envelope n_{50} as per test result	0.82 h⁻¹	≤ 1.0 h⁻¹	✓
Mean value of individual building component thermal protection :			
Exterior insulation to ambient Thermal transmittance (U-value)	0.14 W/(m²K)	≤ 0.15 W/(m²K)	✓
Exterior insulation to basement Thermal transmittance (U-value)	0.14 W/(m²K)	≤ - W/(m²K)	✓
Interior insulation to ambient Thermal transmittance (U-value)	0.19 W/(m²K)	≤ 0.35 W/(m²K)	✓
Interior insulation to ground Thermal transmittance (U-value)	- W/(m²K)	≤ 0.61 W/(m²K)	-[1]
Thermal bridges Δ_U Building envelope (window installation excluded)	0.05 W/(m²K)	No limiting value	
Windows Thermal transmittance $U_{w,installed}$	0.87 W/(m²K)	≤ 0.85 W/(m²K)	✓[2]
Exterior doors Thermal transmittance $U_{w,installed}$	- W/(m²K)	≤ 0.80 W/(m²K)	✓
Ventilation unit Effective efficiency of heat recovery	80 %	≥ 75 %	✓

[1] Limiting value is not relevant [2] Exception made due to mitigating circumstances

Certification criteria met? Selection of the evalulation method	**Space heating demand**	
	Component quality	✓

Certifier:

William South, London, June 2015

GROSVENOR

sturgis carbon profiling™

Technical Challenges

BISRIA Monitoring – 3 Trades Involved

Electrical sub-meters

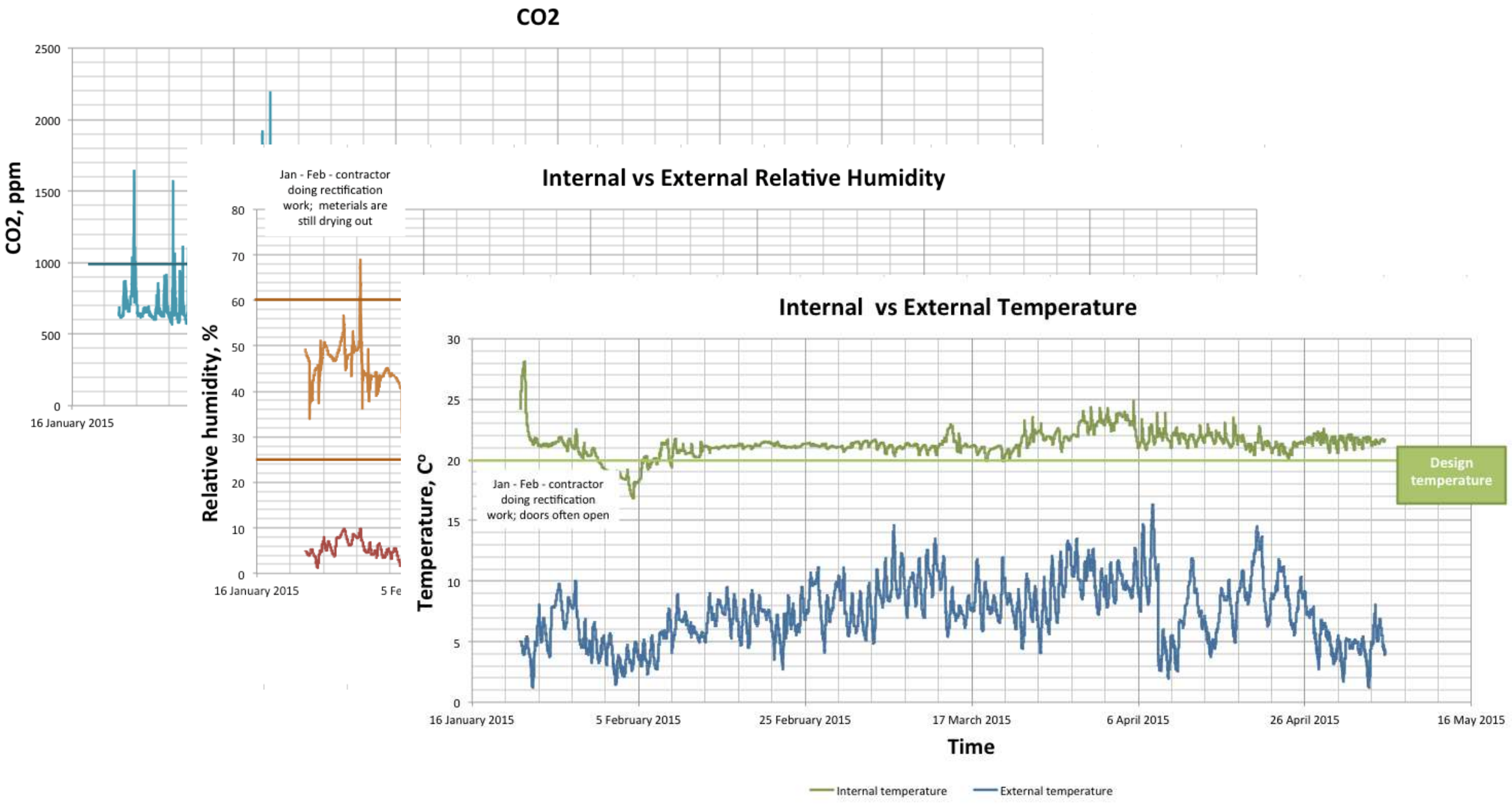
Internal temperature and CO2 meter

Domestic hot water flux meter

GROSVENOR sturgis carbon profiling™

Technical Challenges

BISRIA Monitoring – Check Results Regularly

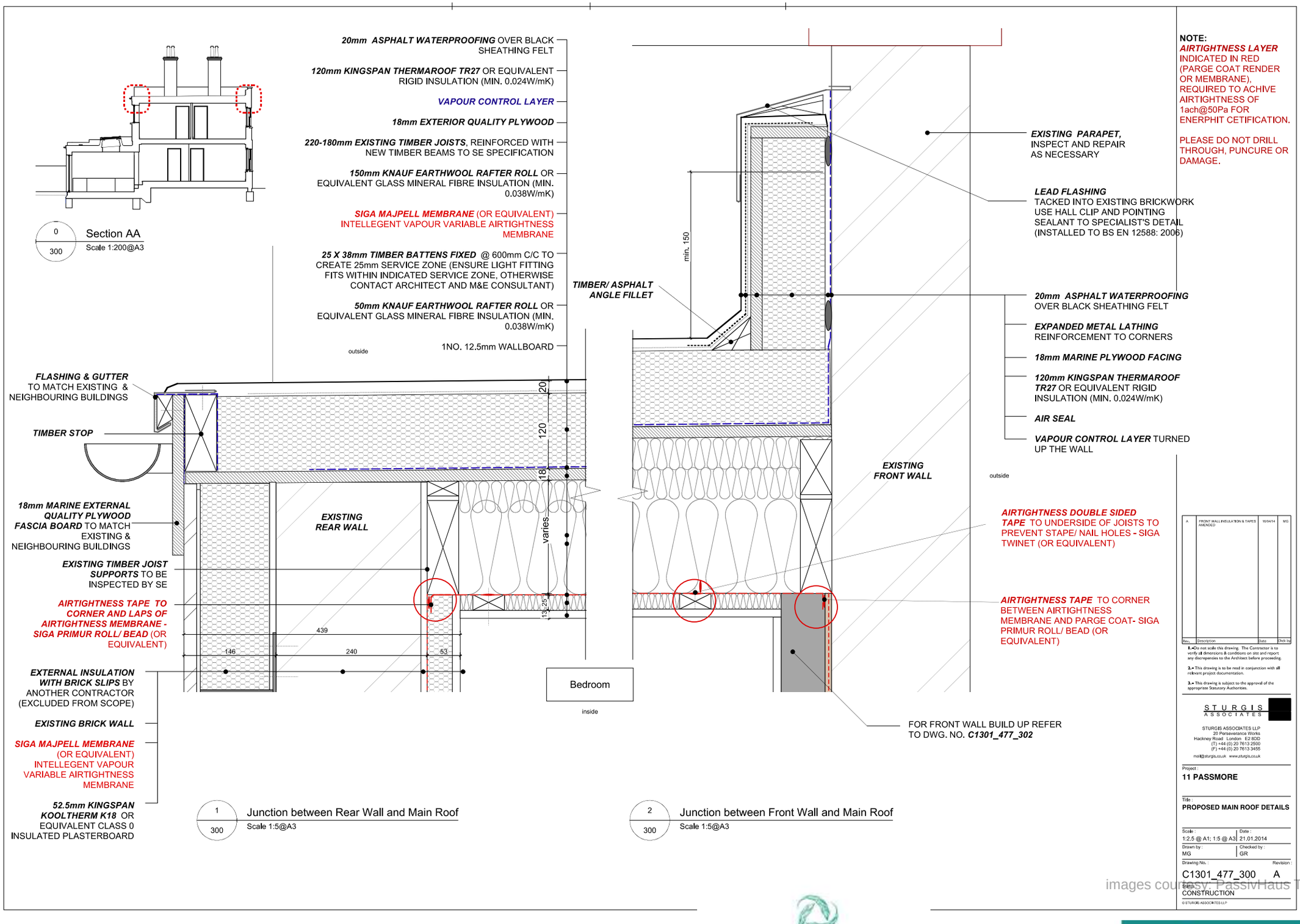


CO2, RH and Temperature – 1st heating season

GROSVENOR sturgis carbon profiling™

Technical Challenges

Linear Thermal Bridging



images courtesy: PassivHaus Trust

GROSVENOR

sturgis carbon profiling™

Technical Challenges

Linear Thermal Bridging

sturgis carbon profiling
20 Perseverance Works, Hackney Road, London E2 8DD
T +44 (0) 20 7613 2500 F +44 (0) 20 7613 3455 W www.sturgiscarbonprofiling.com

31

Software:	Therm 7.2.5	Date:	18/06/2014
Job Name:	11/19 Passmore Street	Job No:	C1301_477_300_1
Tab name:	Ambient Junction (2)	Completed by:	MF
Descrip:	Main Roof - rear wall junction	Checked by:	MG

Data colum	Row	Name	Ufactor name	Length mm	U factor	L2D W/Km
S	16	Roof	External	1850	0.1004	
T	16	Rear wall	Internal	1850	0.1799	
U	16	L2D	Internal			0.5222

U - value calculation for data row	Roof	
Check surface resistances correct		y
Checl total length correct		y
Modelling U Value (W/m2K)		**0.100**

U - value calculation for data row	Rear wall	
Check surface resistance correct		y
Checl total length correct		y
Modelling U Value (W/m2K)		**0.180**

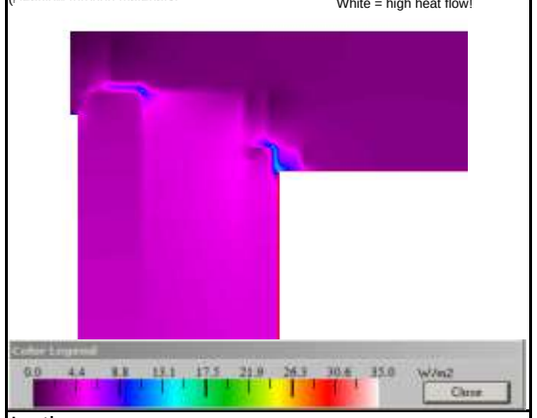
Psi calculation		length mm	U-value/L2D1 W/m2K	heat flow W/mK	psi value W/mK
L2D				0.522	
Roof	Length time U value:	1677	0.100	0.168	
Rear wall	Length time U value:	1637	0.180	0.294	
				0.059	
psi Internal					**0.06** W/mK

Psi calculation		length mm	U-value/L2D1 W/m2K	heat flow W/mK	psi value W/mK
L2D				0.522	
Roof	Length time U value:	2120	0.100	0.213	
Rear wall	Length time U value:	1988	0.180	0.358	
				-0.048	
psi External					**-0.05** W/mK

Error in calculation:	From therm report - worst cell	1.4 %

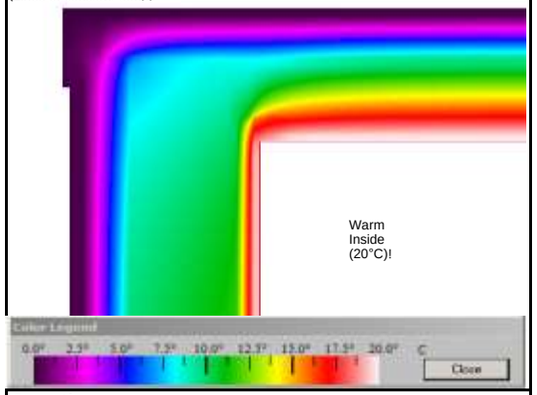
Heat Flux
(Heatflow through materials)

Black = no heat flow
White = high heat flow!

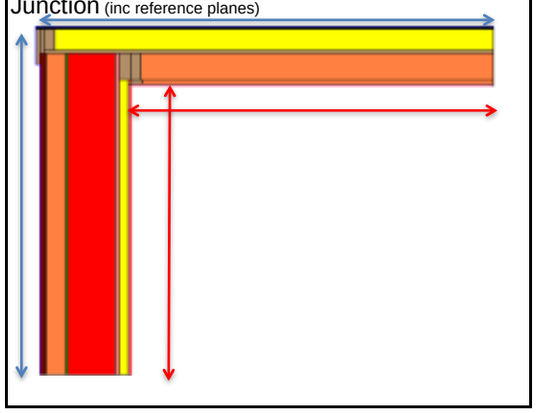


Isotherms
(Lines of constant temp)

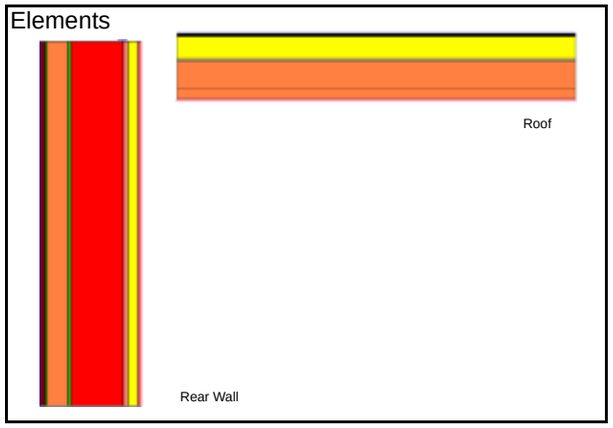
Cold Outside (0°C)!



Junction (inc reference planes)



Elements



sturgis carbon profiling
20 Perseverance Works, Hackney Road, London E2 8DD
T +44 (0) 20 7613 2500 F +44 (0) 20 7613 3455 W www.sturgiscarbonprofiling.com

34

Software:	Therm7.2.5	Date:	18/06/2014
Job Name:	11/19 Passmore Street	Job No:	C1301_477_300_2
Tab name:	Ambient Junction	Completed by:	MF
Descrip:	Main roof - Front Wall Parapet	Checked by:	MG

Data colum	Row	Name	Ufactor name	Length mm	U factor	L2D W/Km
S	16	wall	External	1500	0.1905	
T	16	roof	Internal	1500	0.0794	
U	16	L2D	External			0.4528

U - value calculation for data row	wall	
Check surface resistances correct		y
Checl total length correct		y
Modelling U Value (W/m2K)		**0.191**

U - value calculation for data row	roof	
Check surface resistance correct		y
Checl total length correct		y
Modelling U Value (W/m2K)		**0.079**

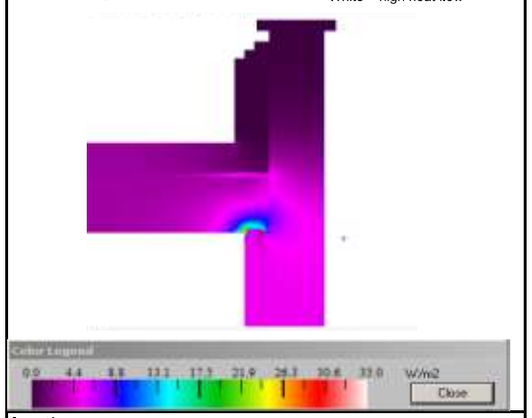
Psi calculation		length mm	U-value/L2D1 W/m2K	heat flow W/mK	psi value W/mK
L2D				0.453	
wall	Length time U value:	1500	0.191	0.286	
roof	Length time U value:	1520	0.079	0.121	
				0.046	
psi Internal					**0.05** W/mK

Psi calculation		length mm	U-value/L2D1 W/m2K	heat flow W/mK	psi value W/mK
L2D				0.453	
wall	Length time U value:	1920	0.191	0.366	
roof	Length time U value:	1840	0.079	0.146	
				-0.059	
psi External					**-0.06** W/mK

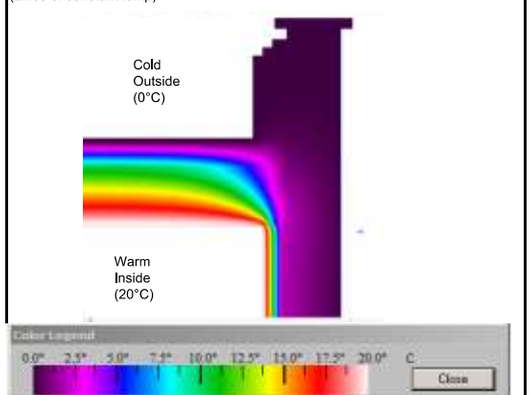
Error in calculation:	From therm report - worst cell	1.2 %

Heat Flux
(Heatflow through materials)

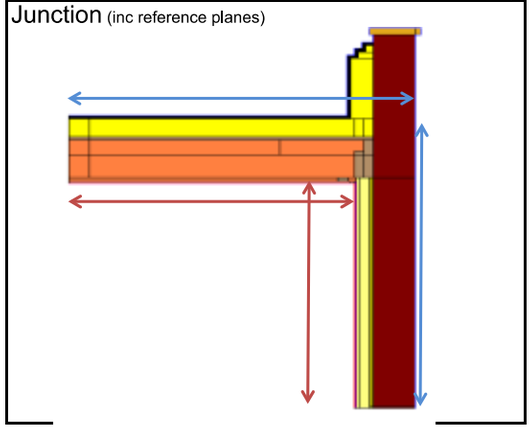
Black = no heat flow
White = high heat flow



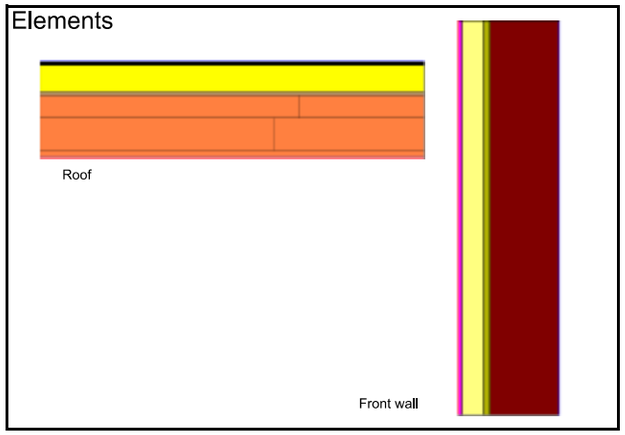
Isotherms
(Lines of constant temp)



Junction (inc reference planes)



Elements



GROSVENOR sturgis carbon profiling

Technical Challenges

3D Thermal Bridging

Aerogel insulation

Cellular glass insulation

GROSVENOR sturgis carbon profiling™

Technical Challenges

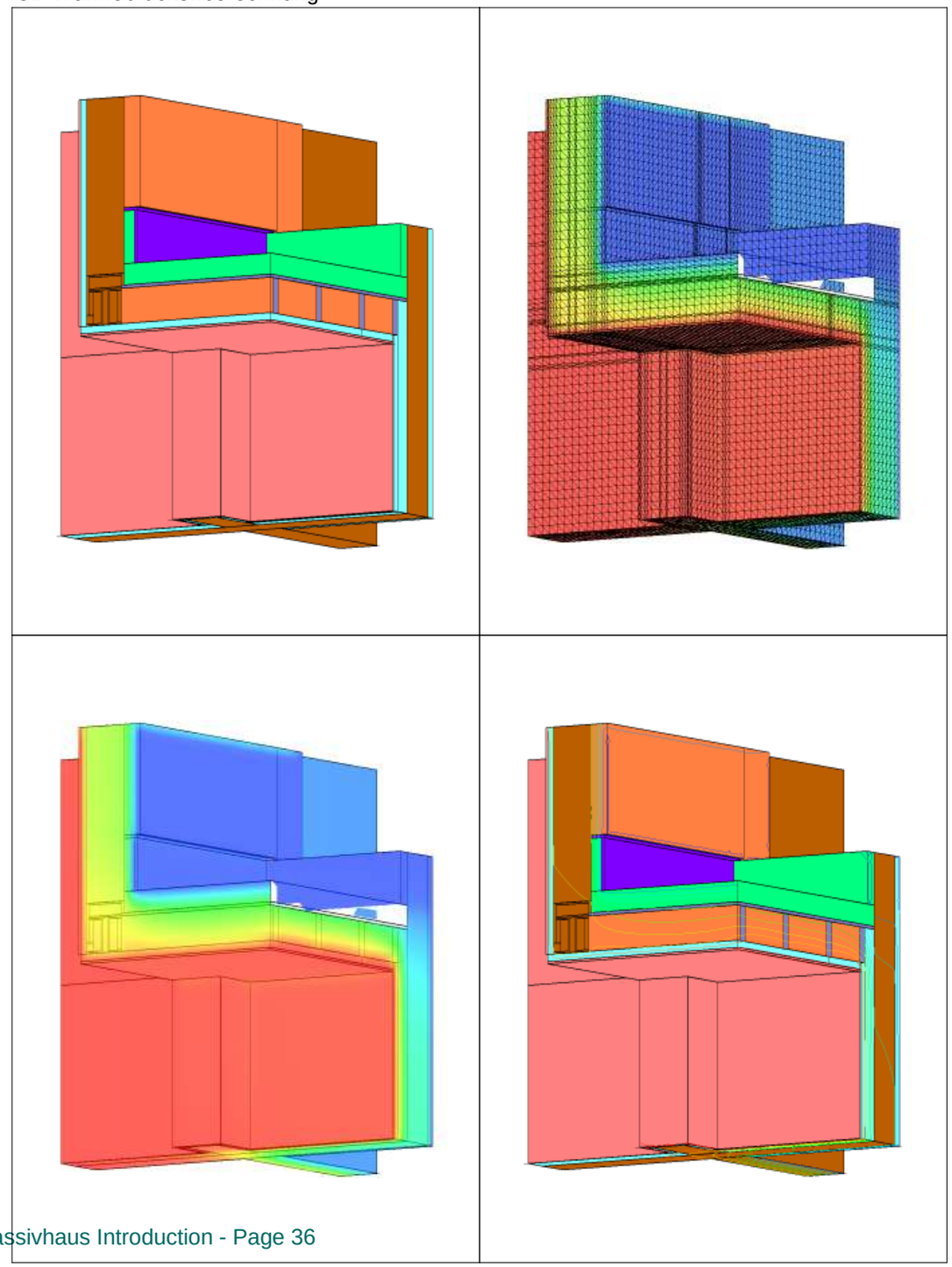
3D Thermal Bridging

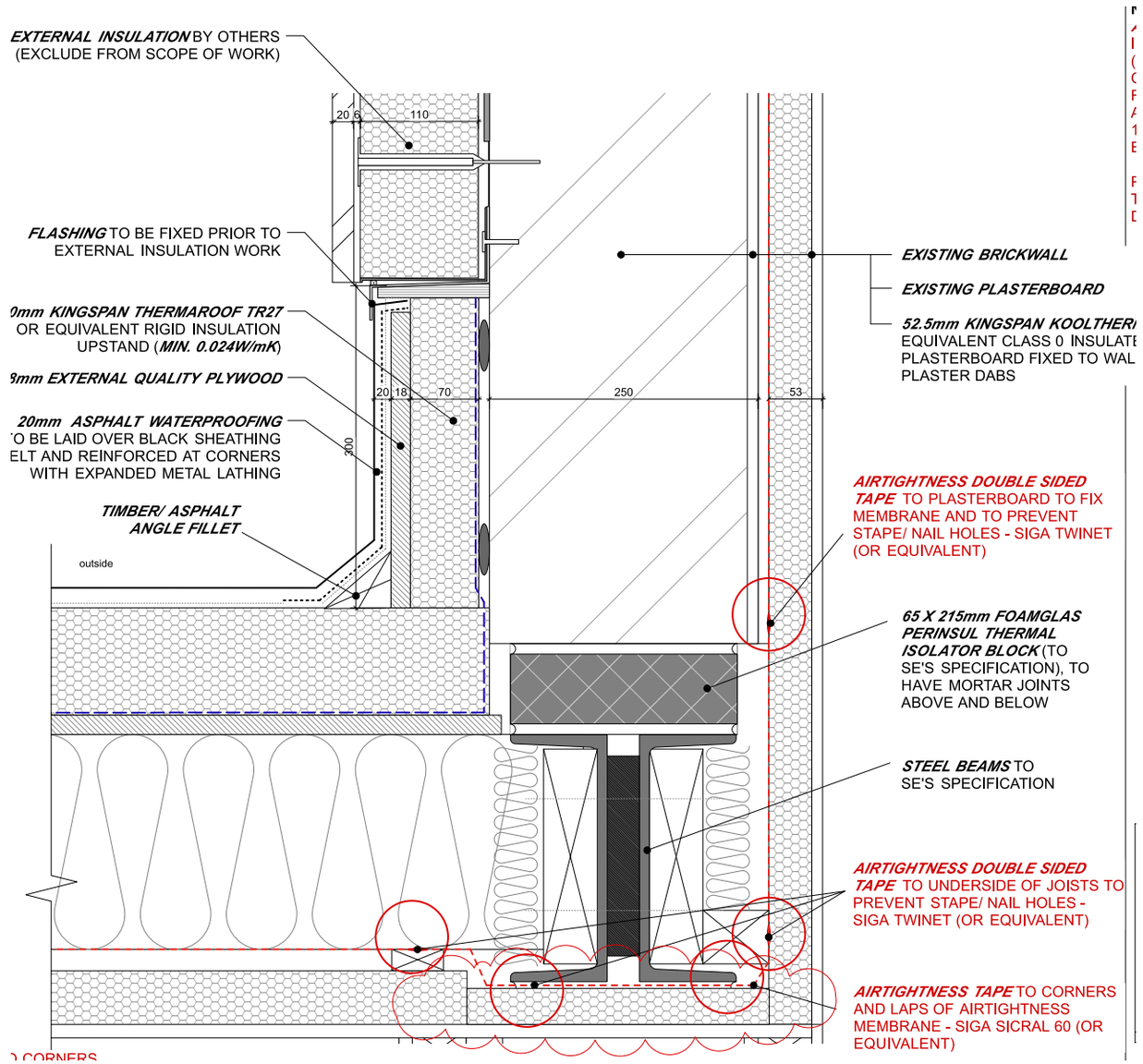
Bauvorhaben:

Psi-Therm 3D

Datum: 30.5.2014

3D Wärmebrückenberechnung



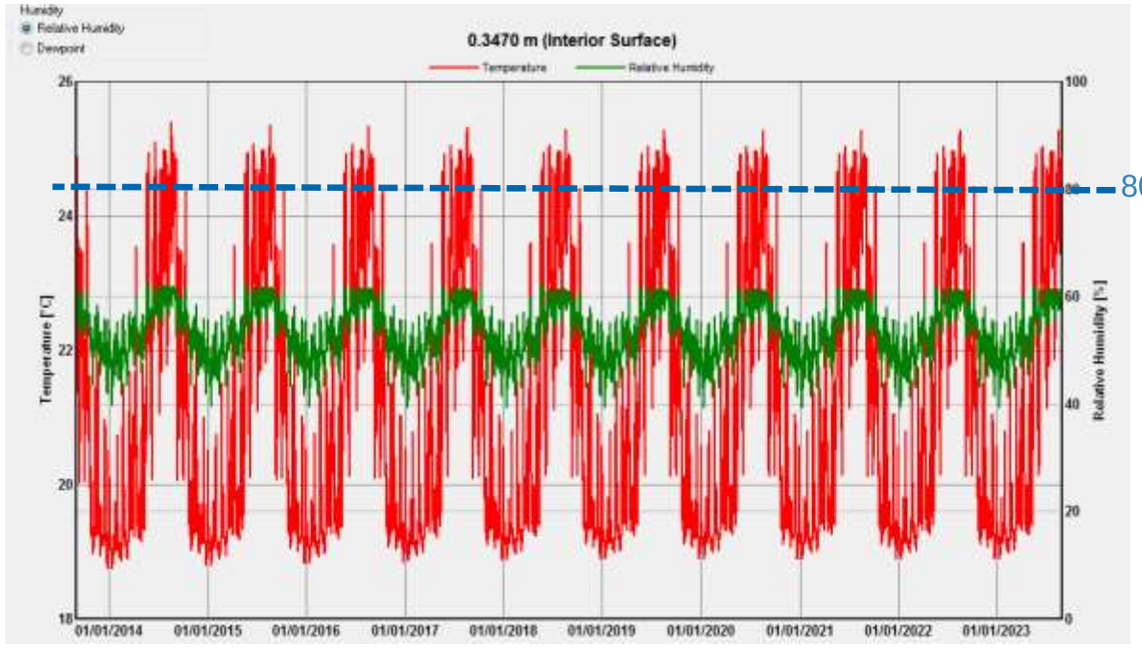


Detail	Description	ΔT in calc	Proposed	Base	Difference	Chi
		ºK	Q (W)	Q (W)	Q (W)	(W/K)
Drg 305 Detail 2	Double PFC / Ext Wall / Extension Roof	20	111.35282	111.32981	0.02301	**0.001**

GROSVENOR sturgis carbon profiling™

Technical Challenges

Moisture Risk - WUFI

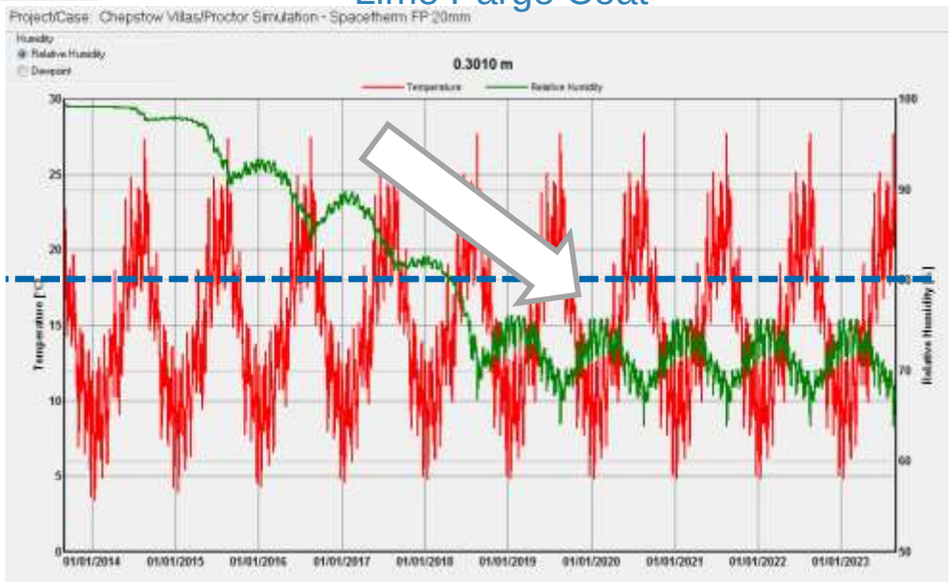


Interior Surface

Lime parge coat – acts as a moisture buffer

Intelligent membrane – one directional moisture transfer

Lime Parge Coat



Construction Moisture Removal

RH below 80% threshold

GROSVENOR sturgis carbon profiling™

Technical Challenges

Moisture Risk – Moisture Meters

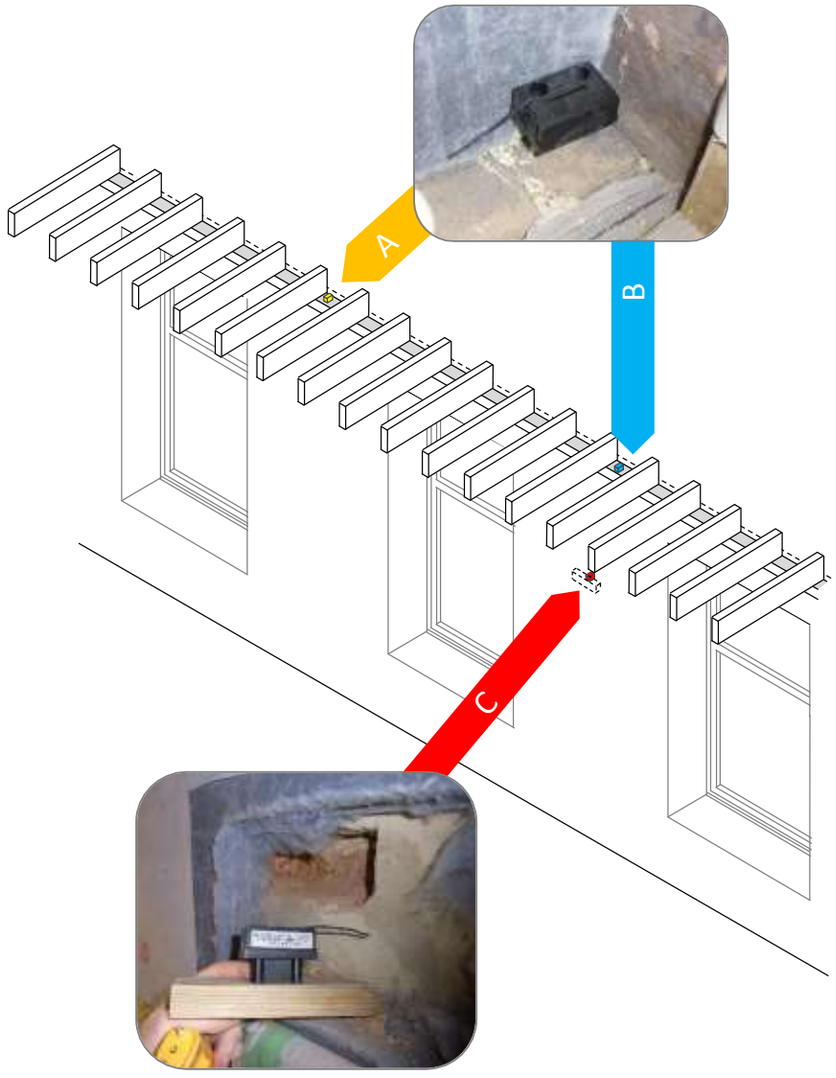
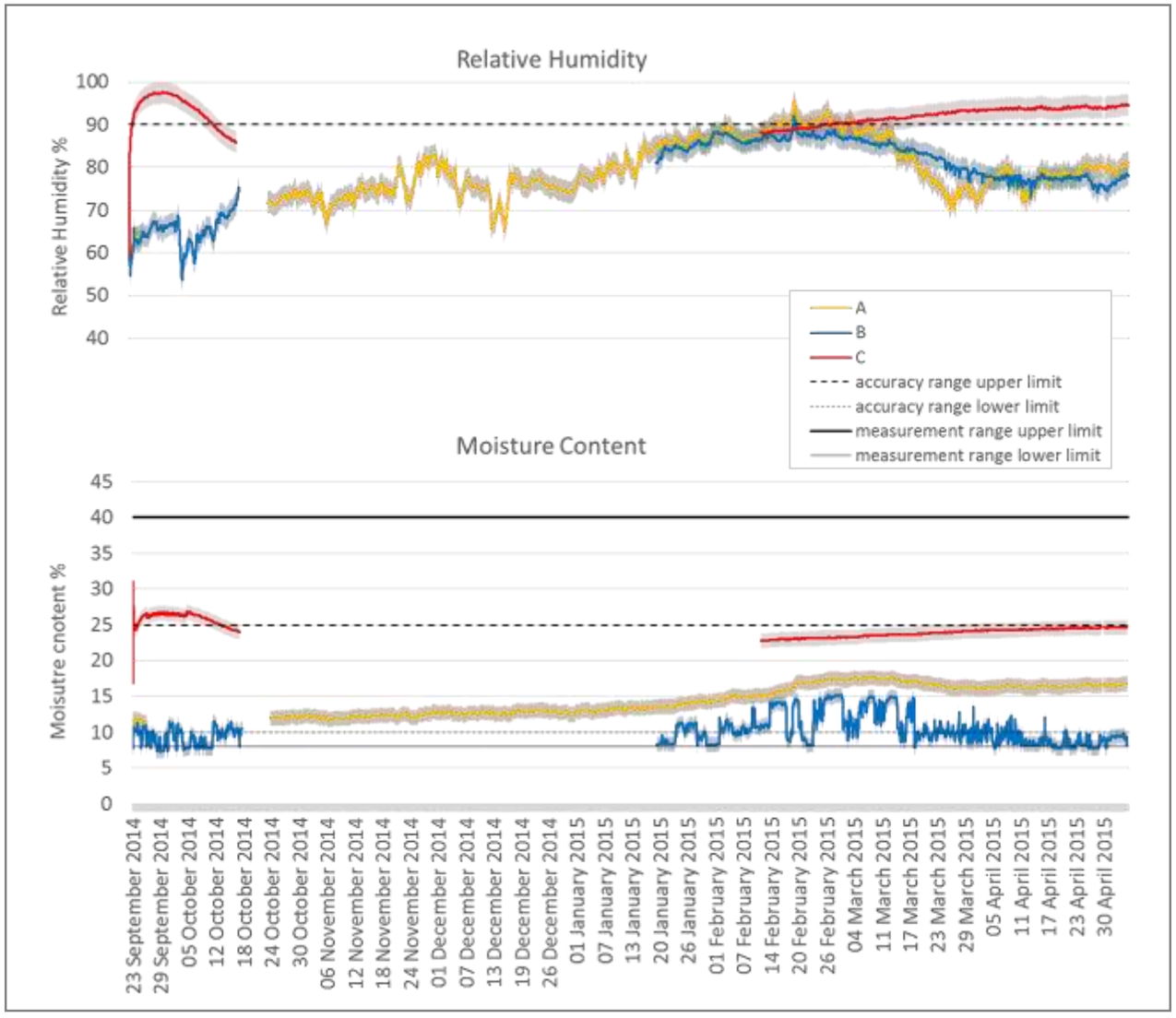


Figure 1: sensor locations



Relative Humidity and Moisture Content in locations A, B and C from September 2014 to May 2015

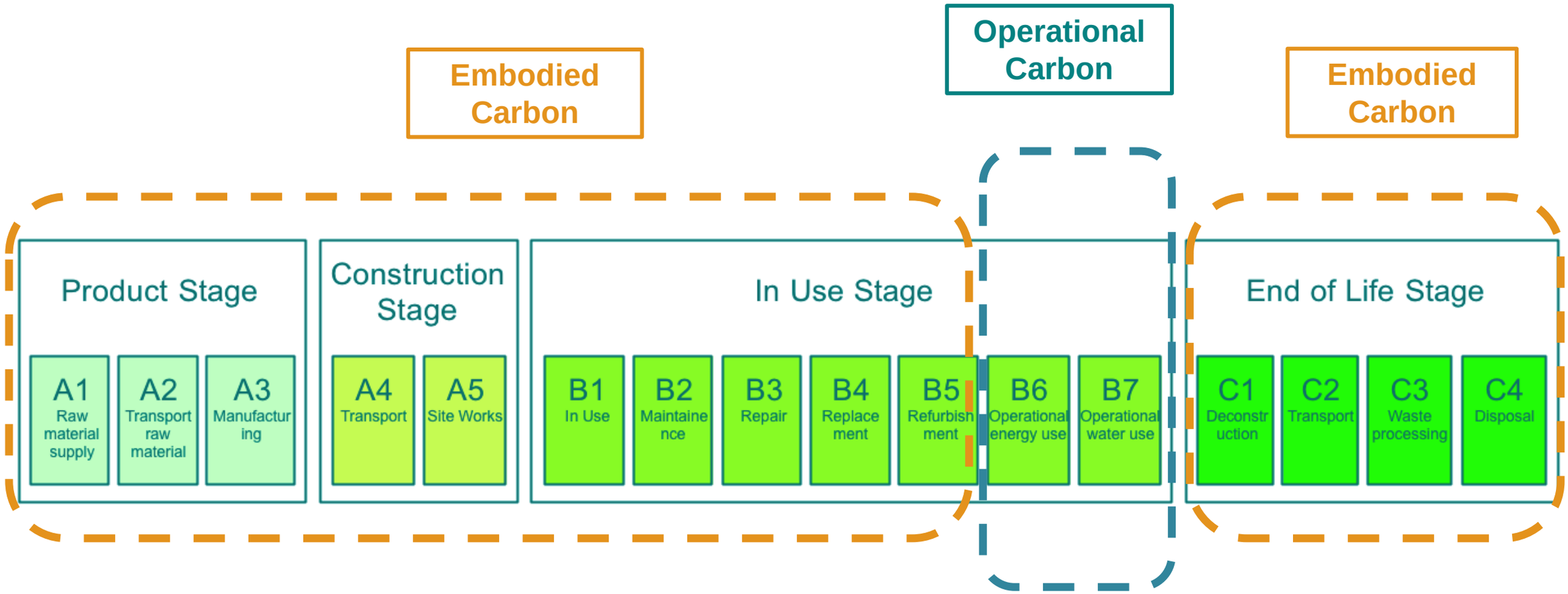
GROSVENOR sturgis carbon profiling™

Saving Further Carbon…

Whole Life Carbon

WLC Explained

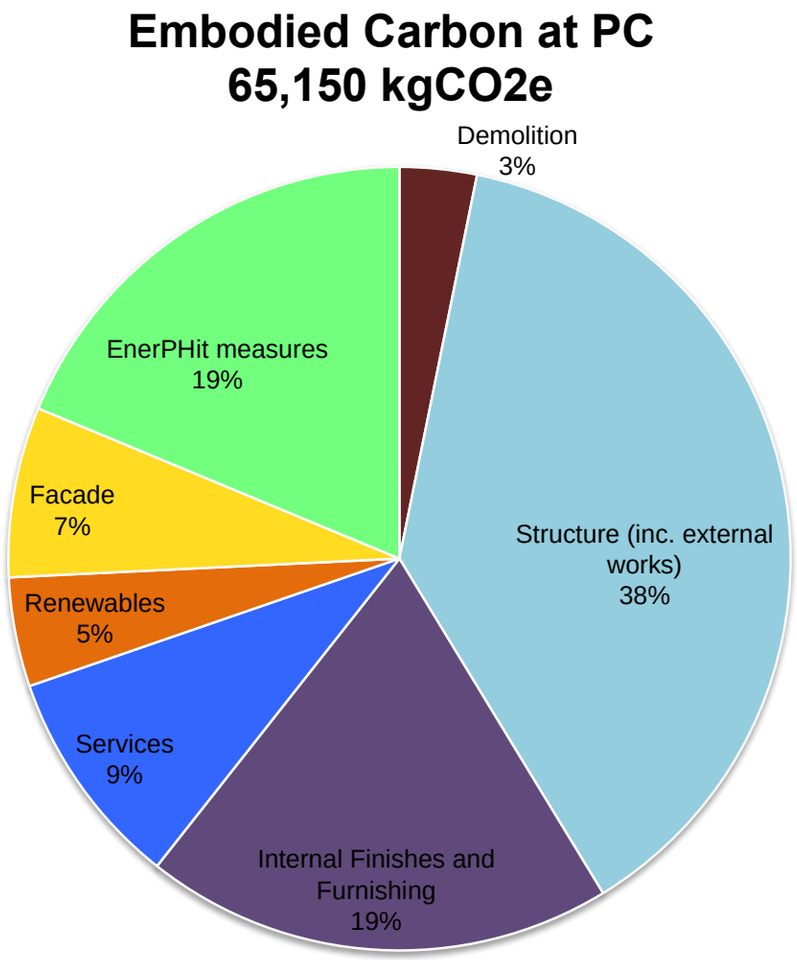
The Whole Life Carbon figures are based on a 60-year reporting period, which takes account of grid decarbonisation (in accordance with BS EN 15978)

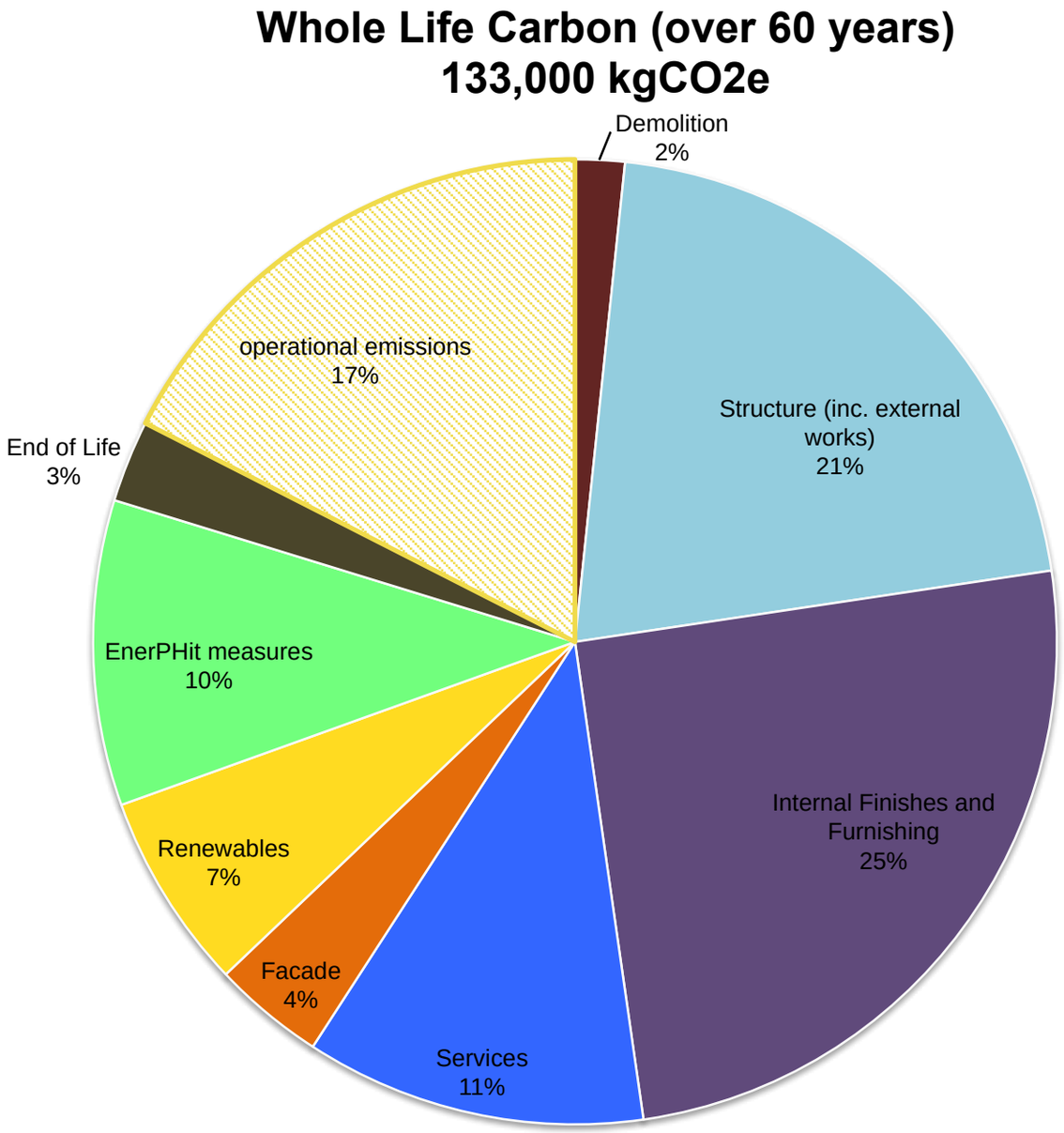


GROSVENOR sturgis carbon profiling™

Whole Life Carbon

WLC for Passmore St EnerPHit



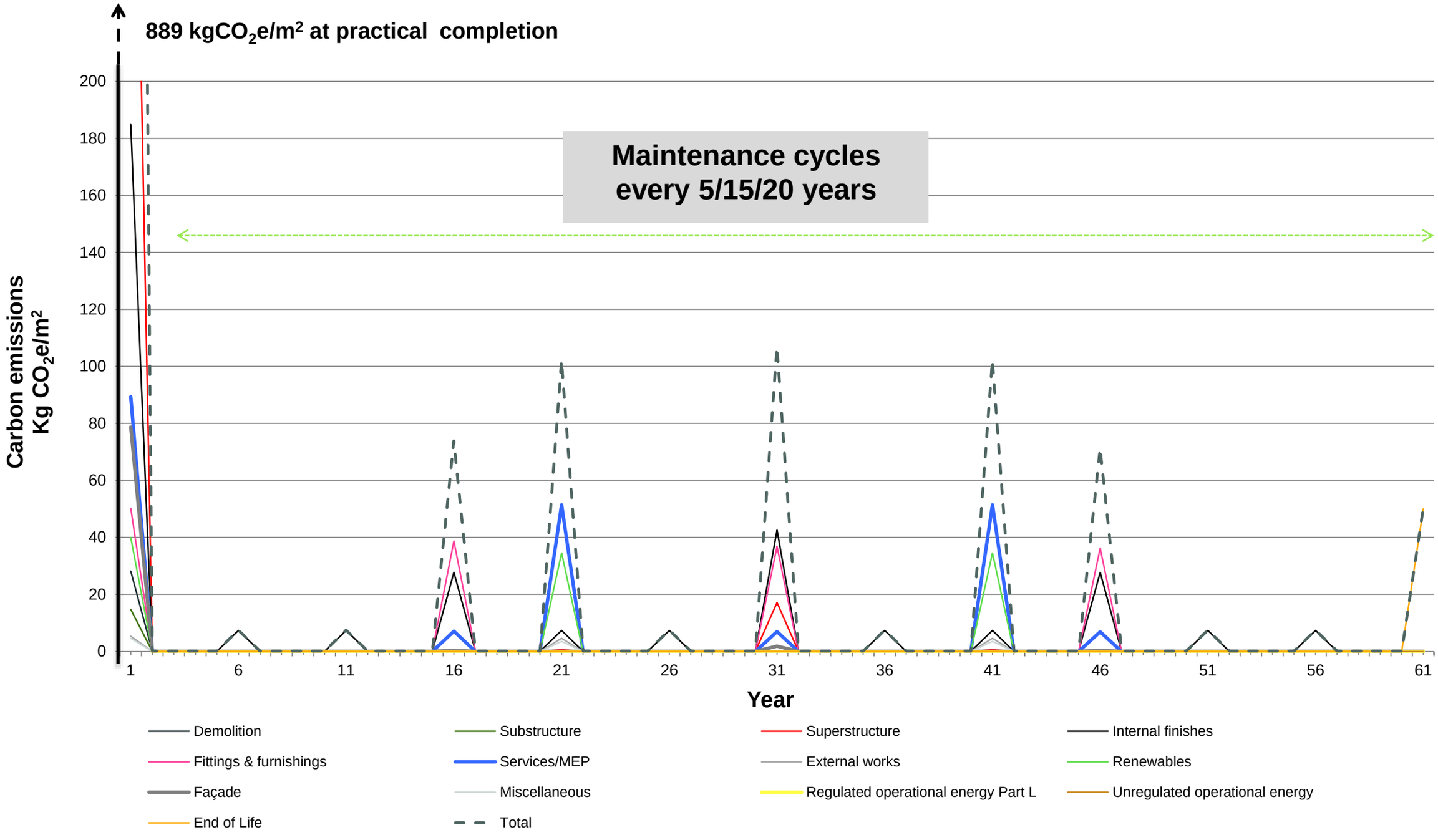


GROSVENOR

sturgis carbon profiling™

Whole Life Carbon

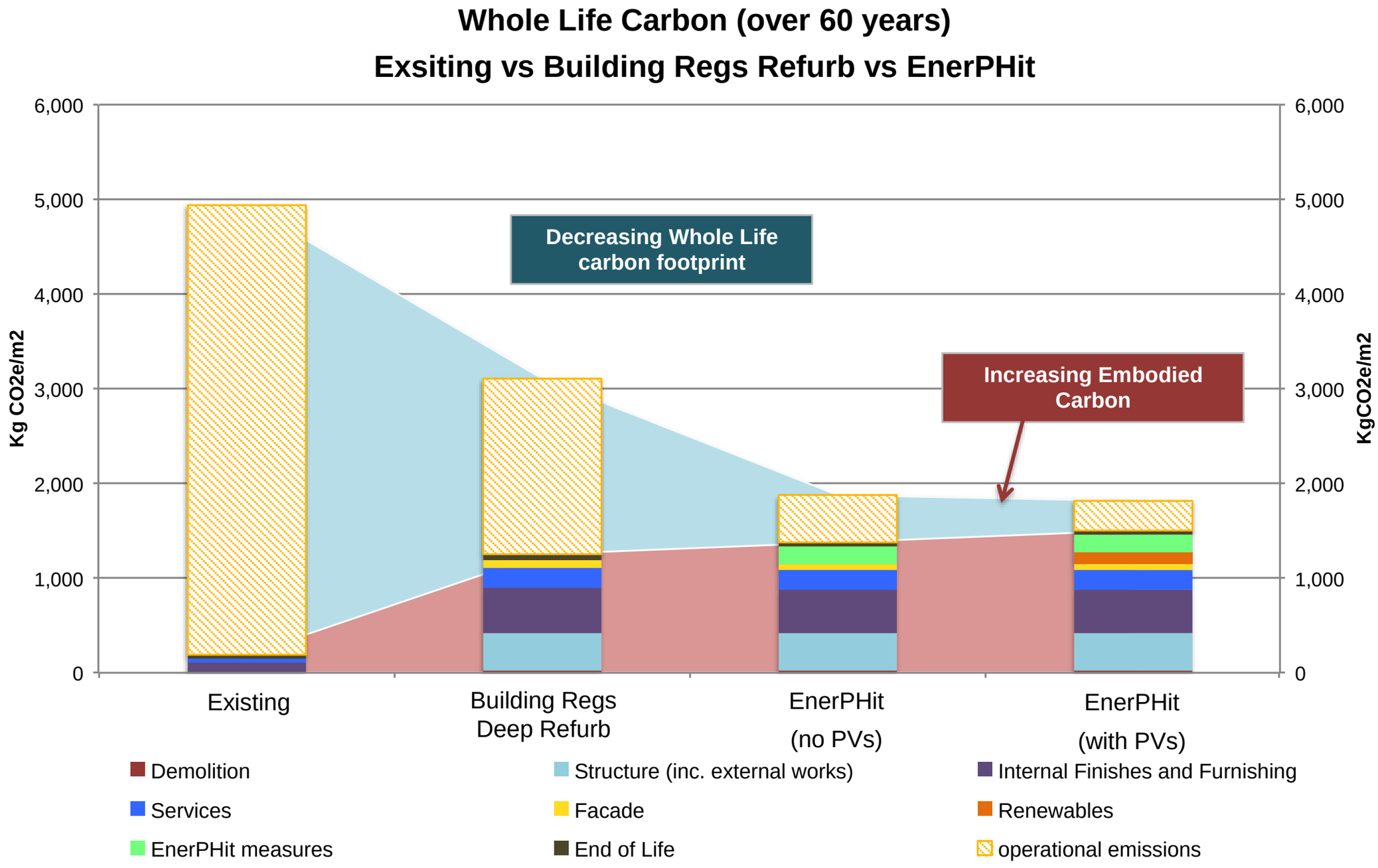
WLC for Passmore St EnerPHit



GROSVENOR sturgis carbon profiling™

Whole Life Carbon

WLC Compared



GROSVENOR sturgis carbon profiling™

Thank you!

If you have any questions contact Maiia Williams
Email: maiia.williams@sturgis.co.uk

GROSVENOR

sturgis carbon profiling™