

# Collaboration and industrialisation in Scotland. Passivhoos Team

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**Matt Bridgestock**

Director / Architect

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# Background

“Design is not just what it looks like and feels like.  
Design is how it works.” Steve Jobs





# Glenalmond Street

Introduced district heat...



East Whins

Passive Solar Design



# Lenzie Passivhaus

Private clients and expertise...



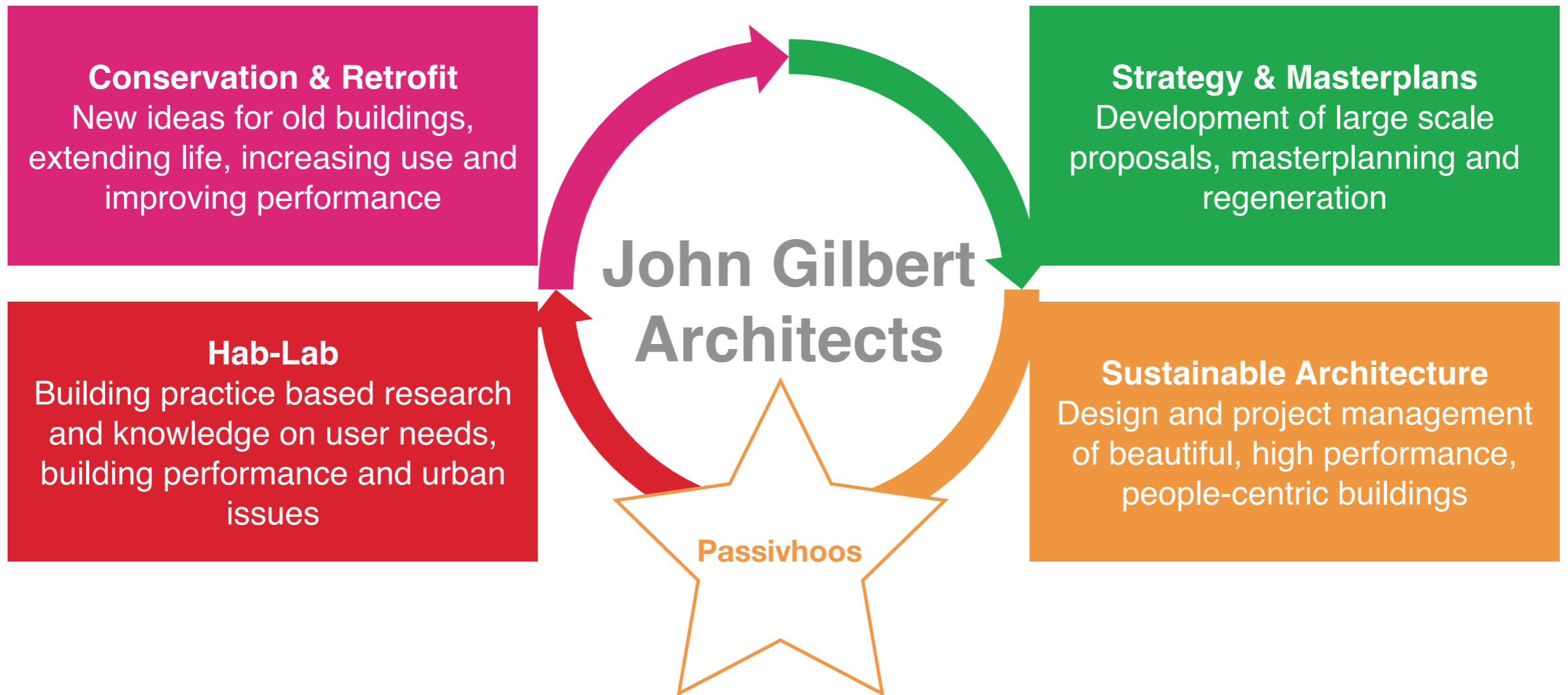
Evidence based design

**John Gilbert**  
ARCHITECTS

Into social housing. PH  
promotion from about 2012

# Our practice....

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# Cunningham House

First Social Housing in Glasgow

# Wider Glasgow developments

Name	Status	Housing Association Client	Housing Mix	Social	MMR	Total
				83	154	237
<b>Carntyne Church</b>	Complete	Shettleston Housing Association	5x flats	5		5
<b>Craigbank</b>	On site	Sanctuary HA	2x houses	2		2
<b>Blawarthill</b>	BW	Yoker Housing Association	9x bungalows 6x cottage flats	15		15
<b>Springfield Cross</b>	Planning	West of Scotland HA	36x flats	36		36
<b>Drysdale Street</b>	Pre Planning	Yoker Housing Association	5x houses	5		5
<b>Dundashill</b>	Pre Planning	West of Scotland HA	89 units consisting of flats and townhouses	15	74	89
<b>Water Row</b>	Pre Planning	Govan HA	85 units consisting of flats and townhouses	5	80	85

Other important Glasgow projects on path to Passivhaus:

- Queens Cross Housing Association renovation of 305 local rent flats in the Woodside, Ceder multis aimed for Passivhaus EnerPhit Standard. Without doubt the most ambitious refurbishment project in UK. It falls short on minor technical standards but is recognised for its ambition and influence in developing Passivhaus in Scotland.

Other Glasgow Housing Associations currently developing Passivhaus standard projects, at feasibility stage:

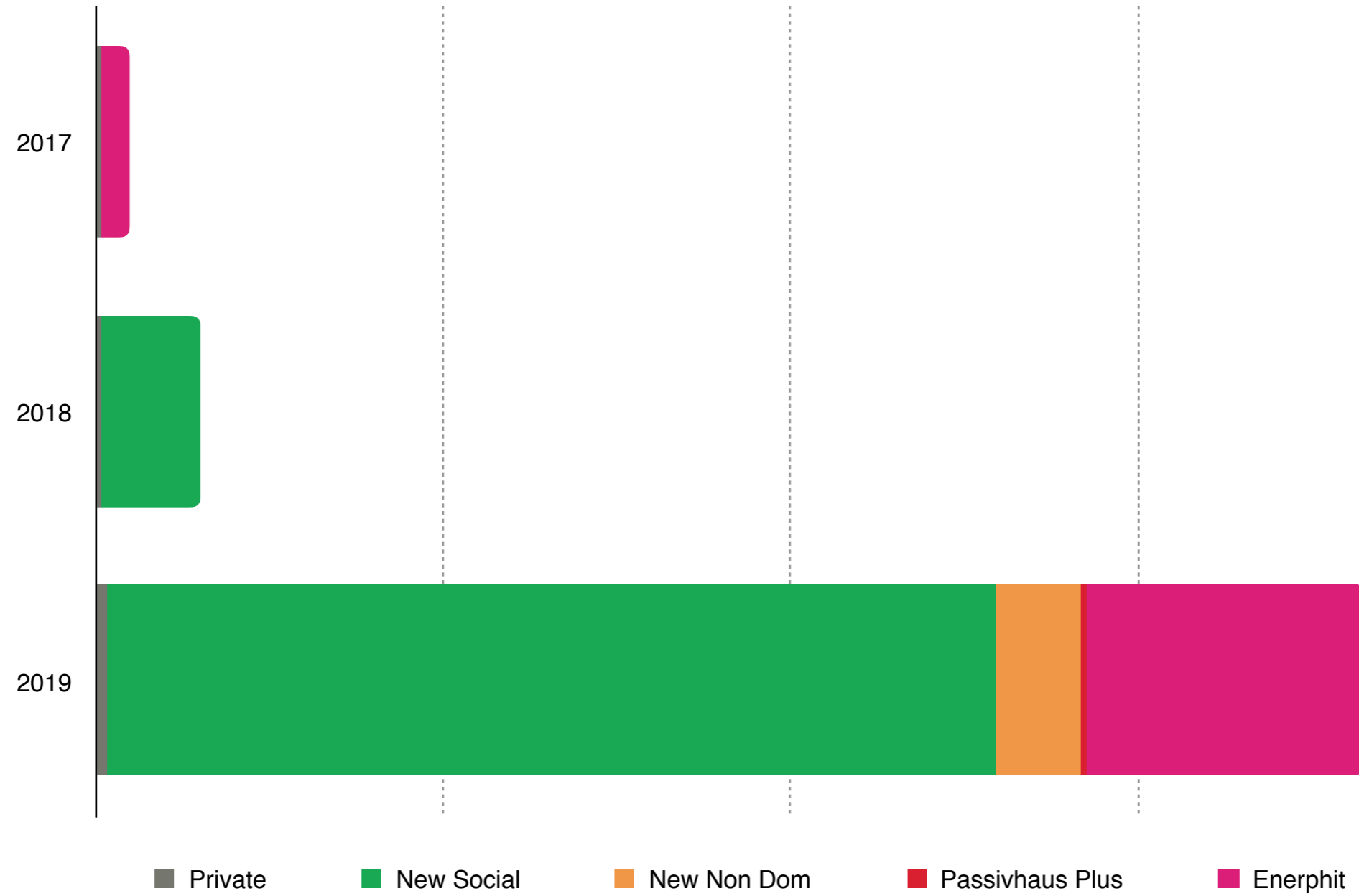
- Parkhead Housing Association
- Yoker Housing Association

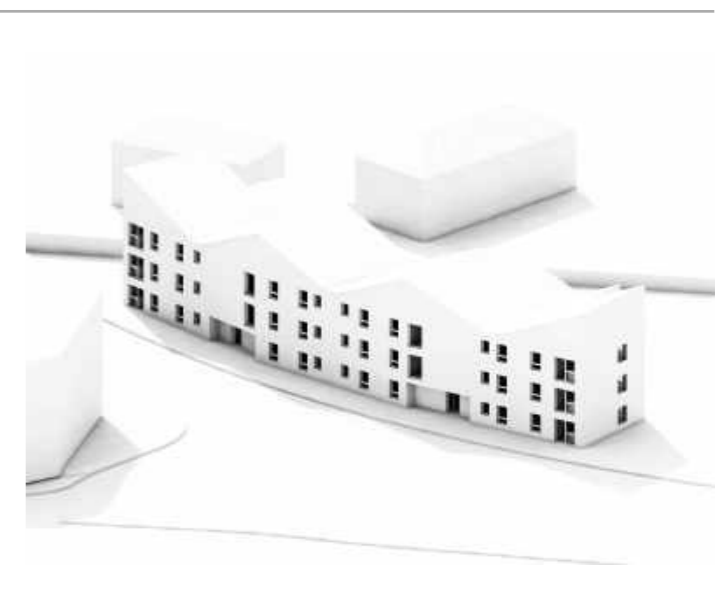
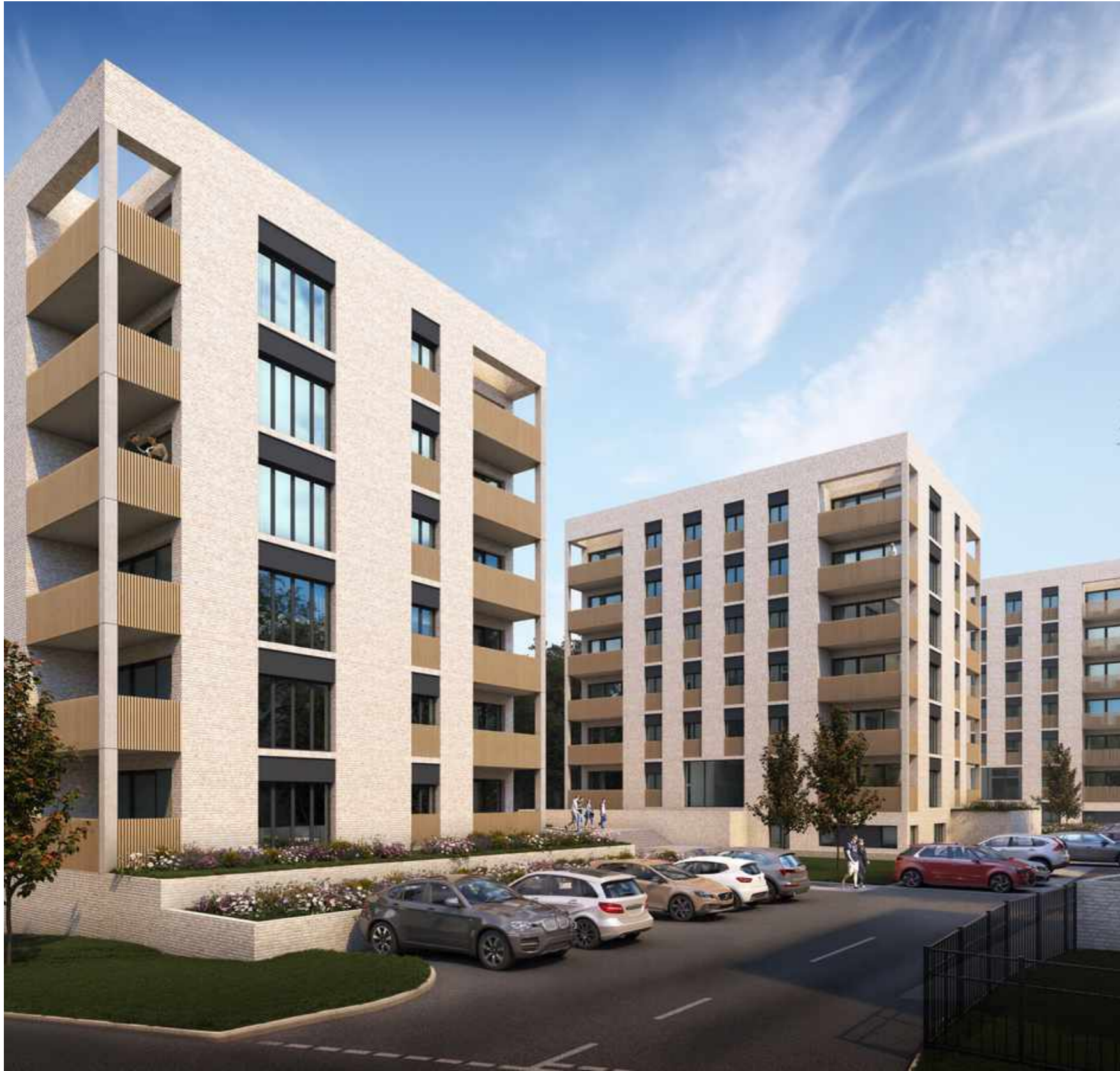
Scottish bodies committed (via committee decision) to building to Passivhaus for all of their future developments:

- West of Scotland Housing Association
- Parkhead Housing Association
- Edinburgh City Council
- Perth & Kinross Council
- Glasgow Housing Investment (Passivhaus option for social housing).

# Increase in Passivhaus work

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Closeburn

Completion early 2020

**John Gilbert**  
ARCHITECTS

Stewart  
& Shields  
Building Contractors  
SITE SAFETY



St Boswells

Completion early 2020

**John Gilbert**  
ARCHITECTS

Stewart & Shields  
Building Contractors  
SITE SAFETY



**Stewart & Shields**  
Building Contractors

**SITE SAFETY**

ALL VISITORS AND DRIVERS MUST REPORT TO SITE OFFICE

CHILDREN MUST NOT PLAY ON THIS SITE

Foot protection must be worn	High visibility jackets must be worn
Safety helmets must be worn	Parents should warn children of potential hazards
No unauthorised persons allowed on this site	<b>Danger</b> Construction Site

Linn Walk

Completion Easter 2020

**John Gilbert**  
ARCHITECTS

How are we upscaling? 4 key actions.



# Action 1: Develop Partnerships



Arch / Eng / Contractor

John Gilbert  
ARCHITECTS



# Core team

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- Architect
  - Director lead
  - Technical Lead
  - Passivhaus trained architects
- Engineer
  - Director lead
- Technical lead
- Contractor
  - Director & Commercial leads
  - Technical director
  - Site manager training
- Associates inc Passivhaus designers & Certification

# Building blocks

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- Information exchange (Procore)
- BIM standards (developing)
- Agreed suppliers
- Agreed performance targets
- Agreed subcontract elements



# Partnership with client / Procurement

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- Really important!!
- Keep the team together
- Frameworks / Bids
- D&B basis for Passivhoos to develop knowledge / costs



Passivhoos Team

Proposals to clients / frameworks



Wider development

HolmesMiller Collaboration

# Action 2: Develop Knowledge





**John Gilbert**  
ARCHITECTS

# Passivhoos KTP

3 year project to commercialise  
Passivhaus social housing



Passivhoos KTP

Claire Coquet - Passivhoos  
Design & Construction Manager



Construction sequencing

Refining process



Supplier development

Meeting social housing specific issues

## Passivhaus Plan of Work

	0	1	2	3	4	5	6	7
<b>John Gilbert ARCHITECTS</b>								
<b>Key Project Outputs</b>		Feasibility Study	Planning Submission	Building Warrant	Construction Documentation			
<b>Team</b>		JGA / Passivhaus Designer / Building Services Consultant (BSC)	JGA / Passivhaus Designer / Passivhaus Certifier	JGA / Passivhaus Designer / Passivhaus Certifier / Building Services Consultant	JGA / Passivhaus Designer / Passivhaus Certifier / Building Services Consultant	JGA / Passivhaus Designer / Passivhaus Certifier / Building Services Consultant	JGA / Passivhaus Designer / Passivhaus Certifier / Building Services Consultant	JGA
<b>Design Advice</b>		<ul style="list-style-type: none"> <li>Design review PD / JGA</li> </ul>	<ul style="list-style-type: none"> <li>Design review PD / JGA</li> <li>Spec Review PD / JGA</li> <li>Liaison with Certifier</li> </ul>	<ul style="list-style-type: none"> <li>Design review PD / JGA</li> <li>Spec Review PD / JGA</li> <li>PD Liaison with Certifier</li> </ul>	<ul style="list-style-type: none"> <li>Spec Review PD / JGA</li> <li>PD Liaison with Certifier</li> </ul>	<ul style="list-style-type: none"> <li>PD Liaison with Certifier</li> <li>Trouble shooting and advice</li> </ul>		Optional - Monitoring
<b>Passivhaus Checks</b>	Get written confirmation of Passivhaus intention, sign-off etc from client, agree targets	Initial design check based on: <ul style="list-style-type: none"> <li>Site layout / Orientation</li> <li>Form Factor</li> <li>Target U-values</li> <li>Indicative M&amp;E</li> <li>Ventilation strategy</li> <li>Building services strategy incl renewables</li> <li>Backstop values</li> </ul>	Update design check based on emerging design and specification. Review on materials proposed by design team.  PHPP Concept check	Full Design Assessment based on evidence supplied on drawings: <ul style="list-style-type: none"> <li>All building fabric components</li> <li>Specification</li> <li>Wall Build ups</li> <li>Target airtightness</li> <li>Detailed ventilation design</li> <li>Building services design</li> <li>Renewables</li> <li>Detailed PHPP</li> </ul>	<ul style="list-style-type: none"> <li>Regular inspections of Passivhaus elements.</li> <li>Toolbox talks to site staff</li> <li>Trouble shooting</li> <li>Arranging of external suppliers toolbox talks</li> <li>Gathering and recording evidence for compliance</li> <li>Arranging testing</li> </ul>	Present information for compliance to certifier		
<b>Analysis Tools</b>		<ul style="list-style-type: none"> <li>PHPP Calculator</li> <li>U-Value calculator</li> </ul>	<ul style="list-style-type: none"> <li>PHPP Calculator</li> <li>U-Value calculator</li> <li>SAP Calc (to check S6 compliance)</li> </ul>	<ul style="list-style-type: none"> <li>PHPP Calculator</li> <li>Evidence register (Certifier)</li> <li>Thermal Bridge Analysis</li> <li>U-Value calculator Manufacturer advice</li> <li>Liaison with BSC on spec.</li> <li>WUFI / Moisture risk calculations (If required)</li> </ul>	<ul style="list-style-type: none"> <li>Evidence register (Certifier)</li> <li>Airtightness Testing</li> <li>Thermal Imaging</li> <li>Record Photographs</li> <li>Site inspection reports</li> <li>Ventilation system testing &amp; commissioning</li> </ul>			BPE kit inc indoor air quality, energy and performance tools.
<b>Output</b>	Client commitment, quote and timescale.	Feasibility report outlining targets for the building based on initial design. Building services strategy including renewables	<ul style="list-style-type: none"> <li>Initial design check compliance document with confidence of meeting PH standard and any risk areas to address</li> <li>Passivhaus certification initial check by Certifier</li> </ul>	Design Compliance report suitable for certification. Detailing confidence in achieving the standard including any risk areas or any certification criteria not being met.	Compliance evidence	Review construction evidence and processing of certification documents. ie Fully completed evidence register for site works Certificate and plaque		Quick Start Guide  In use performance report and advice

### Identifies items required for certification

Passivhaus is an international building performance standard, developed by the Passivhaus Institute (PHI) and Darmstadt University. There are three key components:

- Passivhaus standard and associated certification (by PHI)
- Passivhaus Planning Package (Used to demonstrate certification and performance)
- Passivhaus certified components and designers

Passivhaus standard is the same regardless of the buildings use and is based on a fixed energy use per metre square rather than percentage reduction in carbon.

The 5 Passivhaus principles:

- thermal bridge free design
- superior windows (Triple Glazed)
- ventilation with heat recovery
- quality insulation
- airtight construction.

In order to meet the Passivhaus standard, a designer would work with certifier to develop proposals, check that they comply before starting on site. The certification is based on providing robust evidence that the building has been built as designed, this includes site photos, receipts, airtightness testing and ventilation commissioning tests, this eliminates the performance gap.

For a building to be considered a Passivhaus, it must meet the following criteria:

- The Space Heating Energy Demand is not to exceed 15 kWh per square meter of net living space (treated floor area) per year or 10 W per square meter peak demand.
- In climates where active cooling is needed, the Space Cooling Energy Demand requirement roughly matches the heat demand requirements above, with an additional allowance for dehumidification.
- The Renewable Renewable Primary Energy Demand (PER, according to PHI method), the total energy to be used for all domestic applications (heating, hot water and domestic electricity) must not exceed 60 kWh per square meter of treated floor area per year for Passive House Classic.
- In terms of Airtightness, a maximum of 0.6 air changes per hour at 50 Pascals pressure (ACH50), as verified with an onsite pressure test (in both pressurized and depressurized states).
- Thermal comfort must be met for all living areas during winter as well as in summer, with not more than 10 % of the hours in a given year over 25 °C.
- Passive House buildings are planned, optimised and verified with the Passive House Planning Package (PHPP).

All of the above criteria are achieved through intelligent design and implementation of the 5 Passivhaus principles: thermal bridge free design, superior windows, ventilation with heat recovery, quality insulation and airtight construction.

# Passivhoos K<sub>1</sub>TP

## Plan of work for Passivhaus. Overview and detail.



Passivhoos KTP

Developing digital integration

# Future issues

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- Cost reduction
  - Design
  - Materials
  - Scale
- Reducing embodied carbon
  - Calculation and reduction
- Life cycle costing
  - Working with QS and HA's to establish life costs
  - Work to reduce life costs and maintenance
- Monitoring
  - For completed projects to feedback into design work

# Action 3: Standardise core parts

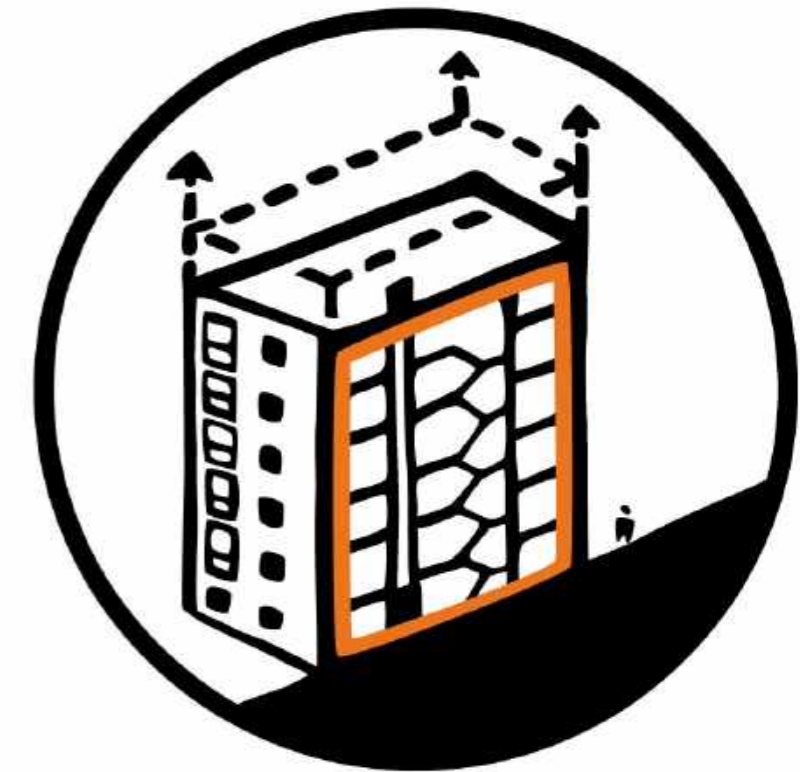




# Prototype Development

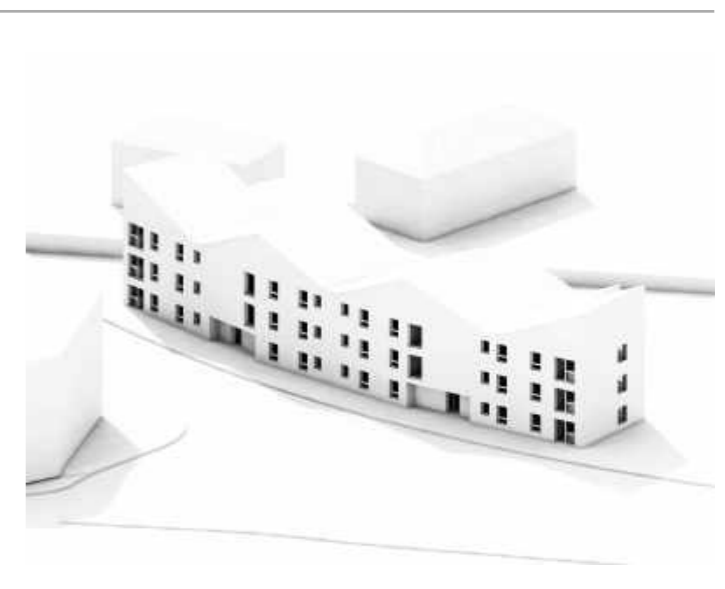
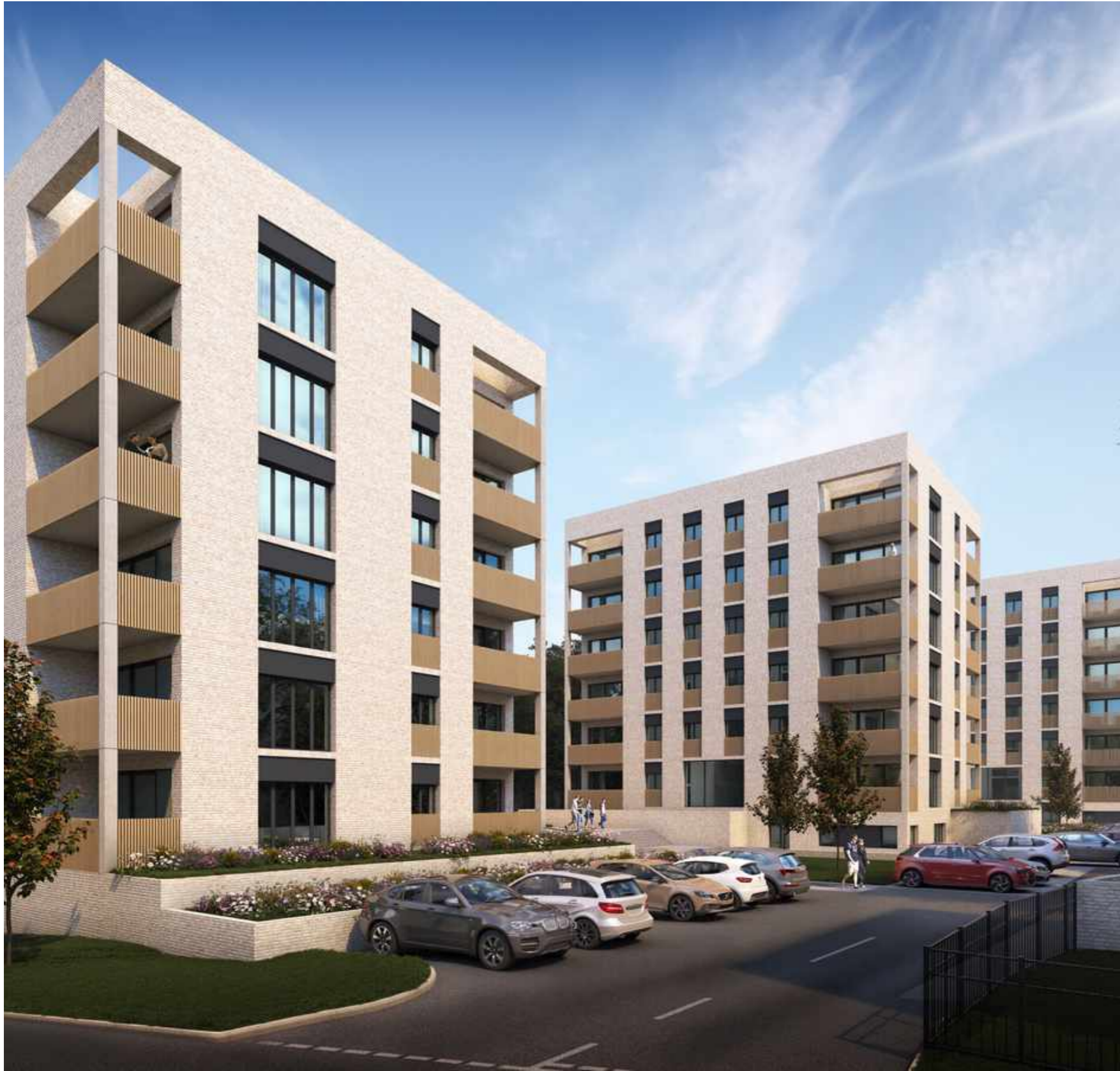
**John Gilbert**  
ARCHITECTS

With Stewart & Shields



# Construction systems

Cost / Build / Supply certainty



# Action 4: Multi-disciplinary feedback



Multi-disciplinary working

**John Gilbert**  
ARCHITECTS

Based on Prototype



Performance feedback

Refine design

# Industrialisation

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- Develop partnerships
- Develop knowledge
- Standardise core parts
- Get feedback

# Passivhoos

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[www.passivhoos.scot/](http://www.passivhoos.scot/)

[www.johngilbert.co.uk](http://www.johngilbert.co.uk)

<http://www.stewartandshields.com>

For more information or to discuss a project please contact:

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- Mark Shields at Stewart & Shields on 01436 672356