UK Passivhaus Conference 2018

New build routes to Zero Carbon

Tom Dollard @dollardtom

13th November 2018

PTE - 2018 Successes

1,038
homes built

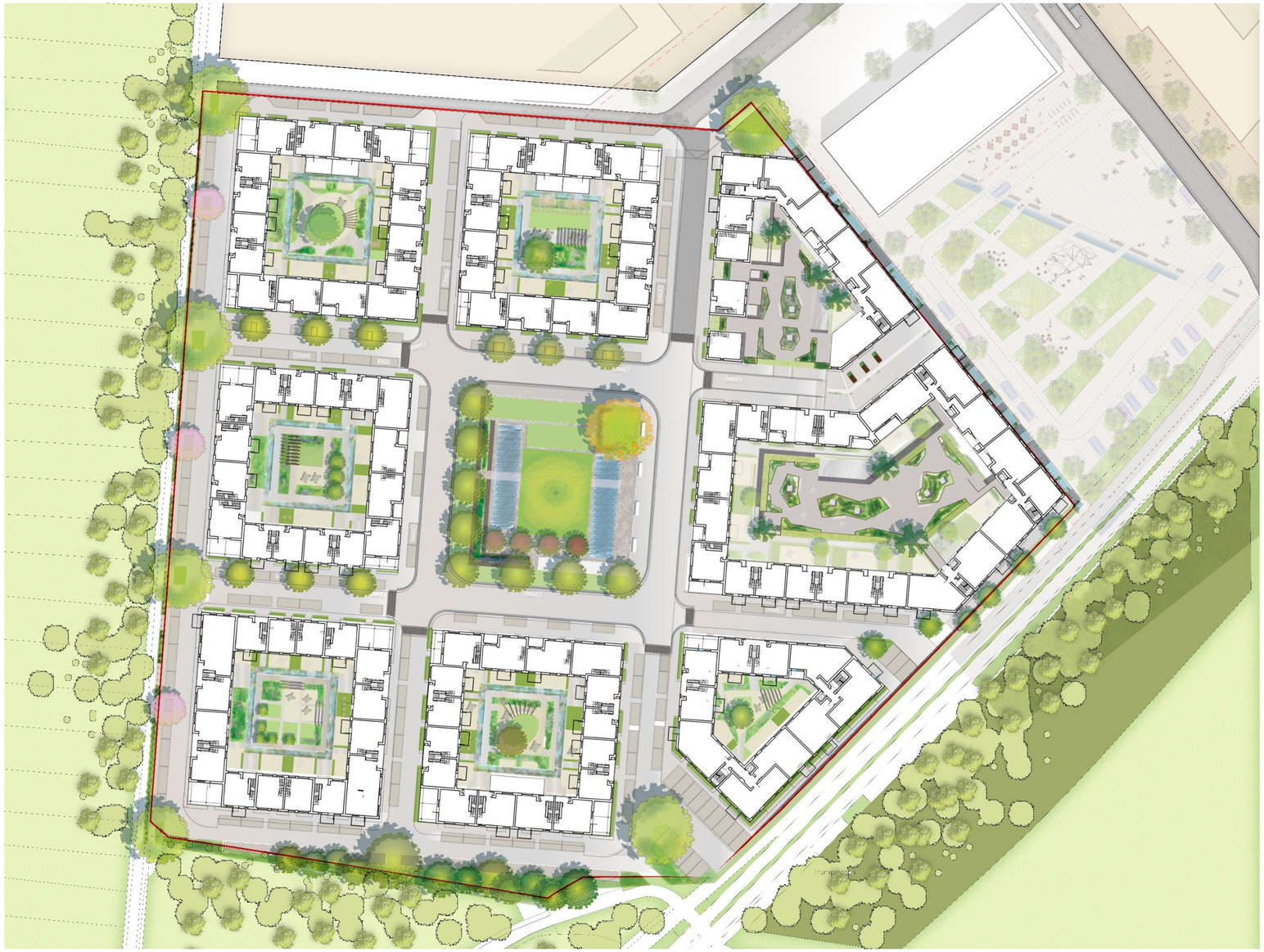
planning permission for
5,105
homes

bd
Architect of the Year Awards 2017
Winner of the Housing Architect of the Year

AJ 100
Winner 2018
Sustainable Practice of the Year

Viridо

- 208 homes + 540m2 mixed use (retail/community centre)
- Complete 2017
- 2 Pilot houses complete 2014 and monitored during 2015/6
- 50% affordable rent / 25% shared ownership / 25 % private sale
- Mixture of flats, maisonettes and houses
- Cambridge City Council and Hill



Virido - Design

- Design Concept inspired by Cambridge Quadrangle
- Public, semi private and private gardens and terraces to foster community interaction
- Design of ground floor entrances to accommodate bikes, bins, buggies, storage for residents
- Repetition of blocks and units for offsite construction
- 100% dual or triple aspect dwellings

Ground floor plan of one of the quads

Clay Farm Cambridge

Elevations and Sections - Work in Progress

NORTH ELEVATION = 20-25% glazing target - no shading

EAST ELEVATION = 35% glazing target

SOUTH ELEVATION = 40%-45% glazing target - external blinds

WEST ELEVATION - 30% glazing target - external blinds

Street elevations

- Elevation design based on orientation, and windows sized for good daylighting (2 - 5% daylight factor throughout)

Virido Completed

Viridо Completed

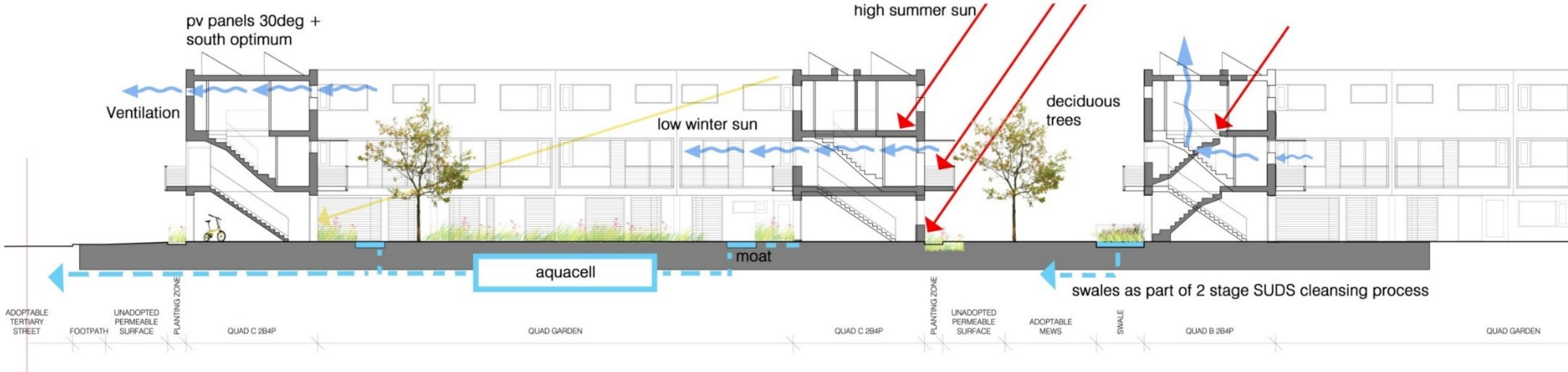
Courtyard elevations

- Internal quadrangle elevations have different materials and landscaping

Virido Completed

Sustainable Design

- Dual or triple aspect dwellings (views, daylight, natural ventilation)
- Narrow plan/ high floor to ceiling heights (3m)
- High window head heights (2.4m)
- Courtyards sized to prevent overshadowing of low winter sun
- Windows sized appropriately and shaded to prevent overheating

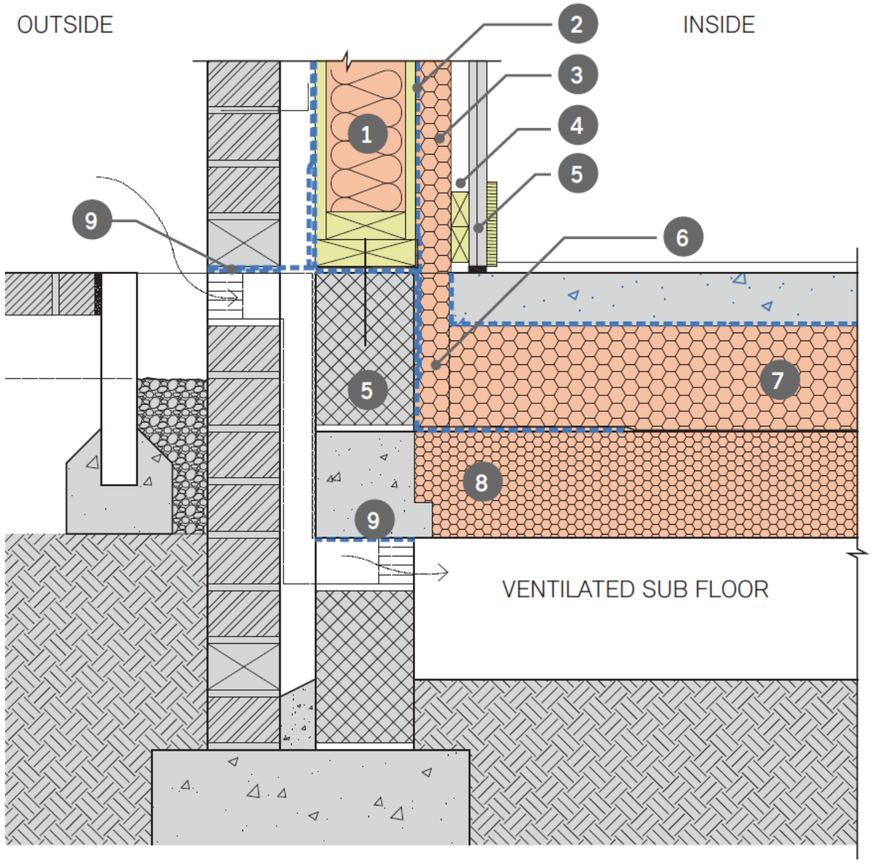


Energy Strategy

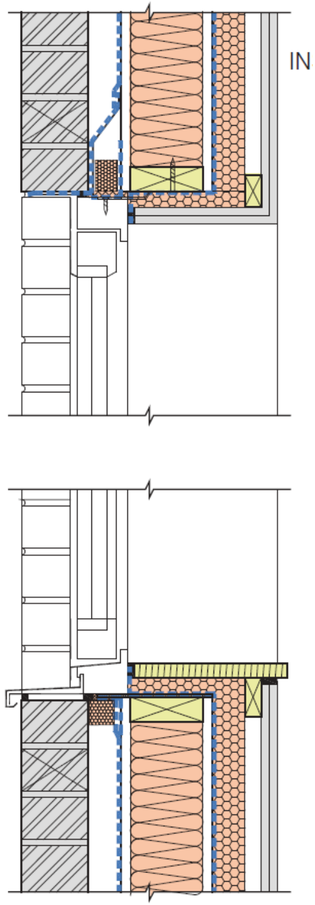
- **LEAN:** Enhanced fabric (passivhaus spec. with SIPS but did not achieve PH airtightness, thermal bridging or ventilation requirements, so not certified PH)
- **CLEAN:** Gas CHP district heating
- **GREEN:** Photovoltaic solar panels to make up to 100% reduction regulated energy.

Virido - Fabric, glazing, ventilation

- Opaque element U-values were between 0.09 and 0.13 W/m2K
- Triple glazed windows (U 0.85 W/m^{2}K)
- Double glazing (U to 1.4 W/m^{2}K) to balcony doors
- Air permeability of <1.5 m^3/hm^2@50Pa.
- Ventilation: MVHR (Ventaxia Sentinel Kinetic)



1. 142 mm SIP
2. Airtight membrane
3. 50 mm internal insulation λ = 0.022 W/m.k
4. Service zone
5. Aircrete block
6. Plasterboard finish
7. 50 mm perimeter insulation
8. Continuous floor insulation
9. Concrete beam with insulation block floor with airtight DPM below and separating layer above
10. DPC



Section Detail

1. Service zone
2. Rigid insulation
3. VCL
4. SIP

Virido **Low and Zero Carbon technologies**

-A total of 550kWp (~3750m2) PV array spread across all blocks.
- Around 480MWh/year whilst producing zero operational CO_2 emissions; this reduces the need for grid electricity and thereby saves about 250 tonnes of CO_2 per year which equates to a 40% reduction in development CO_2 emissions.

Sustainable design and quality control

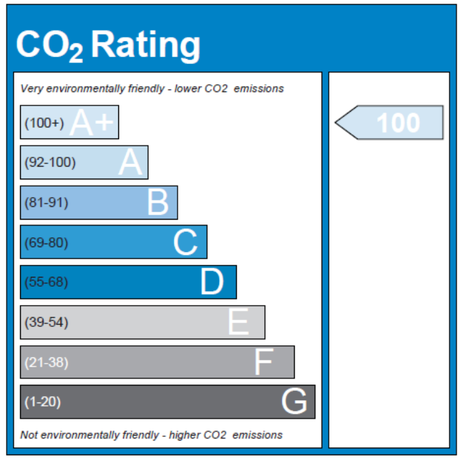
Sustainability Performance

- Code for Sustainable Homes Level 5 final certification (with on site QA process)
- 100% reduction on regulated CO_2 emissions (offsetting all emissions from heating, hot water, ventilation and lighting).
- <80 litres/person/ day water use, which requires high efficiency fittings and rainwater recycling to WCs.
- CSH daylighting credits achieved for all units, with many achieving the maximum issue score.
- Sustainable Drainage Systems incorporated to maintain water run-off levels and quality as pre-development. Achieved using measures such as trapped gully pots, cellular storage and swales.
- Site biodiversity maintained and enhanced, by increasing species numbers in planted areas including biodiverse green roofs.

How this home scored

Category	Percentage of Category Score attained (0 10 20 30 40 50 60 70 80 90 100)	What is covered in the category
Energy	85	Energy Efficiency and CO2 Saving measures.
Water	100	Internal & external water saving measures.
Materials	58	The sourcing & environmental impact of materials used to build the home.
Surface Water Run-off	100	Measures to reduce the risk of flooding and surface water run-off, which can pollute rivers.
Waste	100	Storage for recyclable waste & compost. Care taken to reduce, reuse/recycle construction materials.
Pollution	100	The use of insulation materials and heating systems that do not add to global warming.
Health & Wellbeing	100	Provision of good daylight quality, sound insulation, private space, accessability and adaptability.
Management	100	A Home User Guide, designing in security, and reducing the impact of construction.
Ecology	56	Protection and enhancement of the ecology of the area and efficient use of building land.

Further detailed information regarding The Code for Sustainable Homes can be found at:
www.gov.uk/government/publications/code-for-sustainable-homes-technical-guidance



The CO2 rating is a measure of a home's Carbon Dioxide (CO2) emissions. This rating is shown on your Energy Performance Certificate as the Environmental Impact Rating. This Certificate is available from the seller, and also includes information on how you can improve the home's performance.
The Code measures the sustainability of a home as a complete package, and takes into account other aspects of energy use as well as wider sustainability issues, such as water and waste.

The CO2/Environmental Impact Rating is shown here for information only and does not form part of The Code for Sustainable Homes. Neither Stroma Certification nor the assessment organisation is responsible for the accuracy of this number.

This certificate remains the property of STROMA Certification Ltd and is issued subject to terms and conditions. It is produced from data supplied by the licensed Code Assessor (a "certified" competent person under Scheme Document SD123). To check the authenticity of this certificate, please contact STROMA Certification Ltd.

Communities and Local Government

STROMA

Pilot Houses – Building performance evaluation

- Hill built 2 prototype concept houses in advance of the main project (2015)
- BPE was carried out by Leeds Beckett University on the prototype houses
- Lessons learnt on the 2 pilot homes were incorporated into the main scheme

Copyright in this document and all contents belongs to Pollard Thomas Edwards LLP
(excluding only material reproduced from other sources where shown).

Diespeker Wharf 38 Graham Street London N18JX
020 7336 7777 mail@ptea.co.uk @ptearchitects www.pollardthomasedwards.co.uk

Pollard Thomas Edwards