
Southwest-facing garden


View from East corner

Titel — Brambles

Index — ID 6613

City, Country	Harpenden, United Kingdom
Climate zone	Cool, temp
Year of completion	2020
Certified as	Passive House Plus
Object type	Single family dwelling
Treated floor area [m²]	150.1
Construction	Timber frame structure made from engineered joists (walls, floors and roof) insulated by cellulose fibre and mineral wool; fireproofed with Fermacel boards and intumescent ventilation valves; and protected with a ventilated façade and roof. Ground floor concrete raft slab made from 50% ground, granulated blast furnace slag (GGBS) cement substitute, power floated on top of EPS insulation. Mass-concrete foundations were needed under the raft when the groundworker found an unexpected thin band of clay passing directly under the house, which is located close to mature trees.

U-values [W/(m²K)]

Exterior wall	0.095
Roof	0.097
Ground floor	0.093
Windows	0.97
Glazing	0.88
g-value of glazing [%]	57%

Airtightness concept	Intello vapour control membrane protected by 50mm service cavity, taped to PHI-certified Internorm windows and doors.
n_{50}-value [1/h]	0.3
Ventilation system	Total Home Pichler PKOM 4 compact service unit.Mechanical ventilation for supply and extract air with heat recovery through air-air heat exchanger and two integral heat pumps.
Heating/ cooling/ dehumidification/ domestic hot water	Reversible heat pump for heating and cooling options in air supply and ground floor slab via PKOM4 heat pumps. No dehumidification required. Domestic hot water is also heated by one of the PKOM4 heat pumps and integrated DHW tank.
Renewable energies	10 kWp PV array on south-west facing roof connected to Tesla Powerwall home battery
Other Ecological aspects	On site wastewater treatment using a Puraflow septic tank. All timber (inc. timber frame) is untreated and from sustainable forests in UK and Sweden. All interior finishes are non-toxic and VOC-free. Recycled newspaper insulation.

According to PHPP

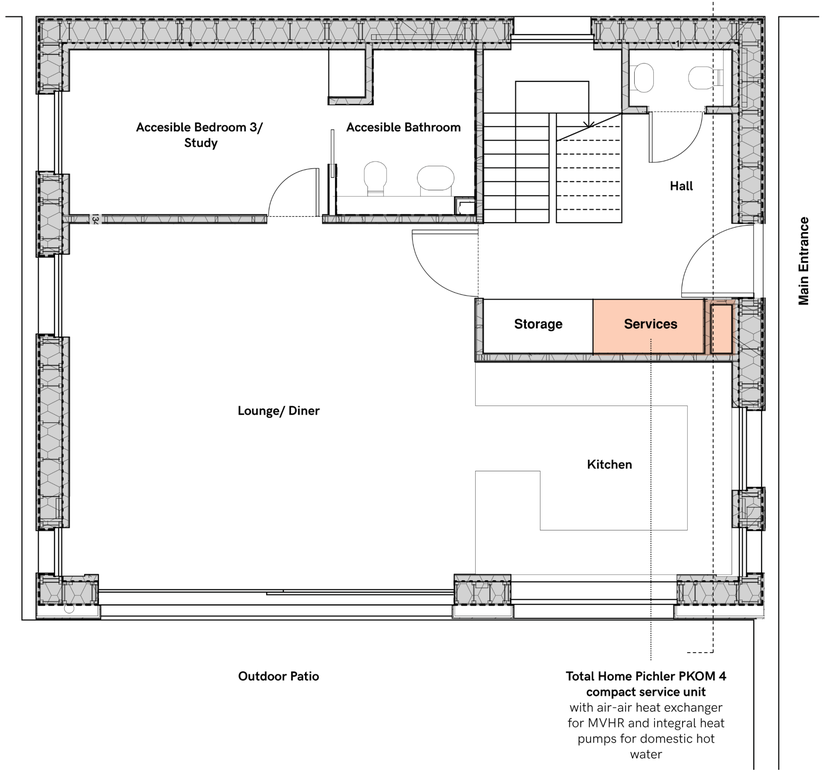
PHPP-version	9.6a	
Heating demand	13	[kWh/(m²a)]
Heat load	10	[W/m²]
Cooling demand	0	[kWh/(m²a)]
Cooling load	0	[W/m²]
Overheating	0	[%]
PER demand	34	[kWh/(m²a_{TFA})]
PER production	103	[kWh/(m²a
PE demand	129	[kWh/(m²a)]

Further notes (e.g. comments on hydrothermal and acoustic comfort)

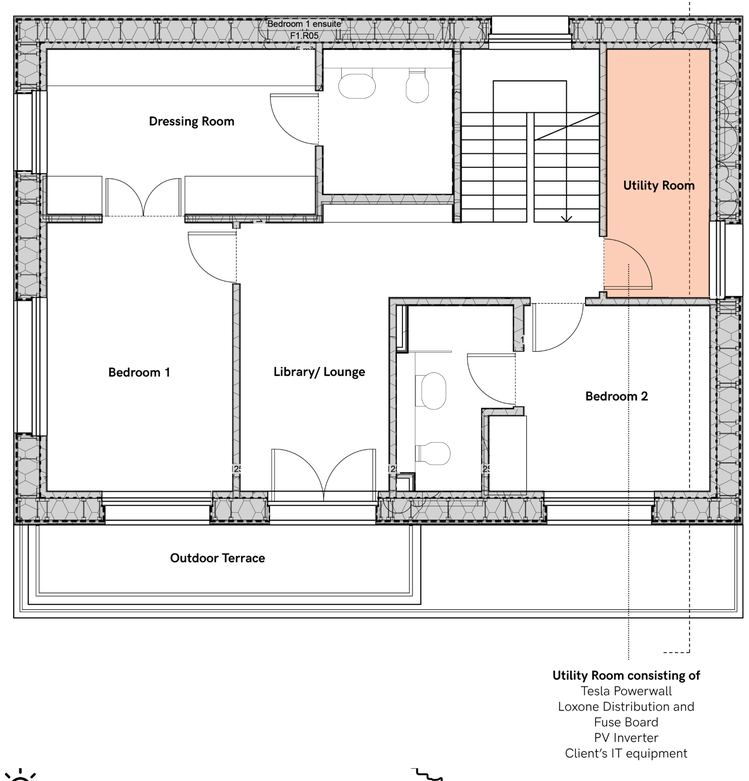
Detached, 2-storey, 3-bed house with kitchen/ lounge area, disabled persons' bedroom/ study and bathroom at lower level & 2 bedrooms, bathrooms, a dressing room and a utility room at upper level. Winter/ Summer comfort by very good fabric U-values, ventilation heat recovery, sound protection glazing and optimal spatial orientation. Superior energy performance is achieved through pairing of rooftop PV array and Tesla Powerwall home battery with the 100% renewably sourced Tesla-Octopus Energy Tariff.

In-use energy performance study has compared Brambles to the 'typical' UK home (UK Govt. source) and to a previously completed Passive House Plus: 'Lark Rise'. Per sq. m, Brambles had an 80% energy saving compared to a typical UK home. It performed more autonomously than Lark Rise, with lower energy demand and higher PV generation. Summer energy self-sufficiency was found to be better than in winter due to more sunshine and lower electrical loads. We have collected a year's worth of energy-use data for both dwellings for publishing this summer.

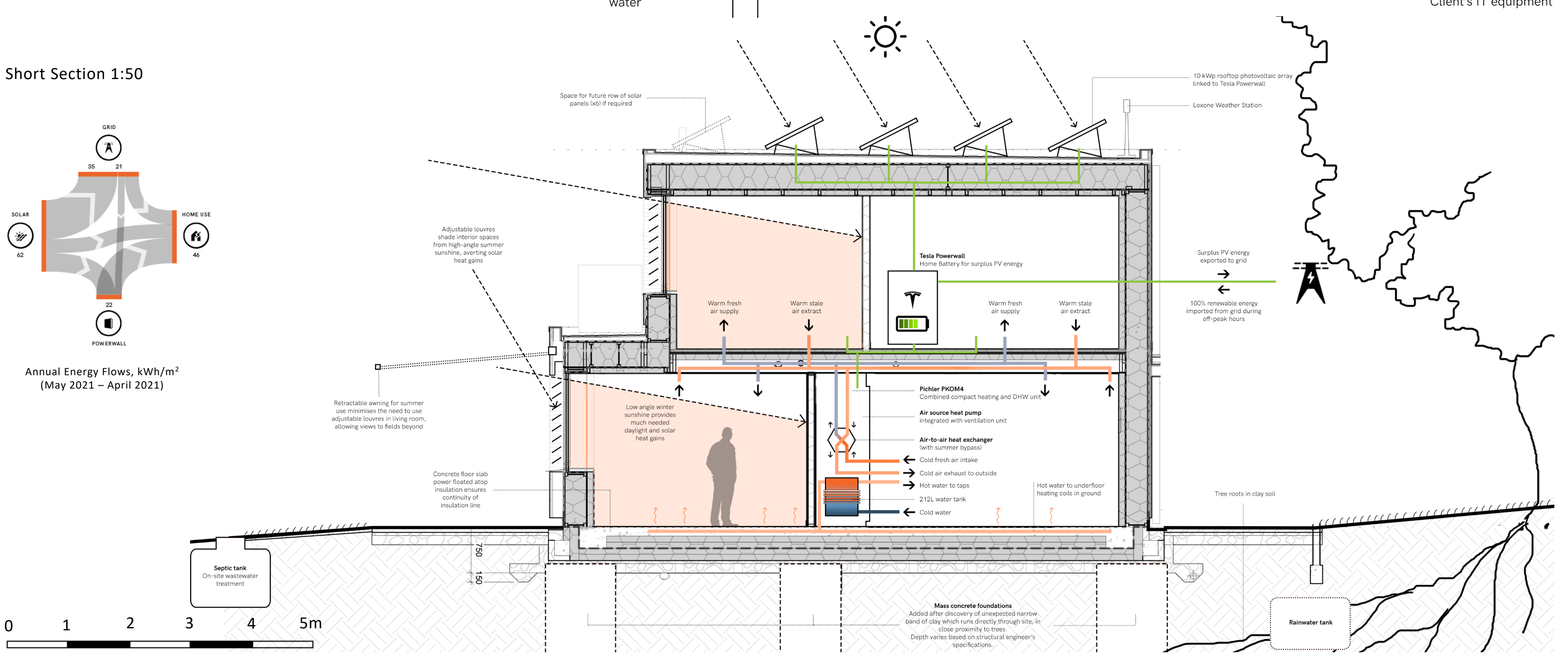
Ground Floor Plan 1:50



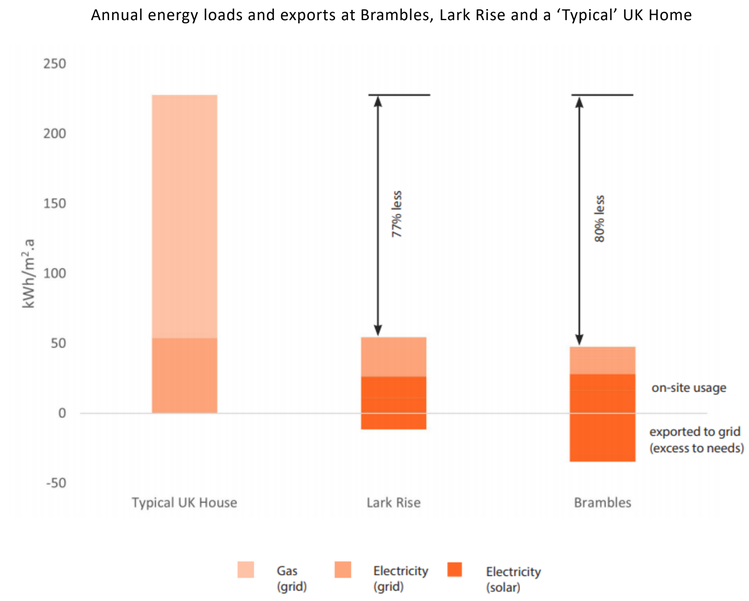
First Floor Plan 1:50



Short Section 1:50



Annual energy loads and exports at Brambles, Lark Rise and a 'Typical' UK Home



'Typical' UK home data from ECUK Tables, 2020.

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