

Planning Application SMD/2021/0636 - Wildwood Alton

Supporting Information for Environmental Benefits

a) Environmental Data

Data taken from Mesh Energy Embodied Carbon Calculator

<https://www.mesh-energy.com/resources/embodied-carbon-calculator-v2>
(using source data from OneClick LCA : <https://www.oneclicklca.com/>)

Actual embodied carbon data is shown on the table on the following page.

The following information and calculations show that a clay tile roof has approx. **10 times more** embodied carbon than a standing seam metal roof.

Similarly, it also shows that facing brickwork has approx. **2.8 times more** embodied carbon than timber cladding.

Material	Embodied carbon per m ³ kg of CO ₂ per m ³	Construction detail	Calculated Embodied carbon per m ² kg of CO ₂ per m ²	Calculation	Total roof surface area 305m ² kg of CO ₂
Staffordshire Blue Tiles (Dreadnought)	658	Single tile = 12mm thick, with overlaps. At max. 100mm gauge, roof construction is effectively 2.65 tiles thick (31.8mm)	20.9	658 x 0.0318	6,382
Standing Seam Metal Roof (coated steel)	3037	Metal Sheet = 0.7mm thick	2.1	3037 x 0.0007	640
Facing Brickwork	266	Brickwork = 100mm	26.6	266 x 0.100	
Timber Cladding	641	Cladding = 15mm thick	9.6	641 x 0.015	

MESH Energy : Embodied Carbon Calculator			
Materials	Global Warming Potential, emb. kg CO₂	Unit	Thermal conductivity, W/m2K
Air cavity	0	n/a	0.18
Clay-board	6	m3	0.14
Hardcore (Type 1) Recycled	11	m3	2
Warmcell cellulose insulation	11	m3	0.039
Soil substrate for sedum roof	31	m3	1
Glass wool acoustic insulation	59	m3	0.037
Glazing Triple (Alu frame)	75	m2	0.8
Mineral wool insulation	77	m3	0.044
Concrete blocks (solid 7kN)	113	m3	1.35
Hempcrete	117	m3	0.07
Glazing Double (Wood and Alu frame)	120	m2	1.2
PIR rigid insulation	140	m3	0.022
Gypsum plasterboard	143	m3	0.19
Strawbales	145	m3	0.052
Glazing Triple (Wood frame)	171	m2	0.8
EPS insulation	173	m3	0.036
Sawn timber (battens, joists, rafters, etc.)	183	m3	0.13
Autoclaved aerated concrete block	184	m3	0.15
Foamglass insulation	201	m3	0.046
Lime render (exterior)	218	m3	0.5
Wood fibre insulation	258	m3	0.04
Bricks	266	m3	0.63
OSB board	272	m3	0.13
Painted pine door	275	m2	0.14
Concrete (poured/cast)	285	m3	1.35
Slate roof tiles	339	m3	1.5
Floor screed	381	m3	1.15
Lime plaster (interior)	400	m3	0.9
Concrete roof tiles	426	m3	1.5
Hardwood plywood	575	m3	0.18
Timber cladding	641	m3	0.13
Clay roof tiles	658	m3	1
Softwood plywood	663	m3	0.14
Stone	763	m3	2
Concrete (Virgin steel rebar reinforced)	510	m3	1.4
Cross laminated timber (CLT)	976	m3	0.13
Cementitious board	1620	m3	0.92
Steel cladding sheets	3037	m3	115
Steel (rebar), 100% recycled content	3575	m3	115
Ceramic floor tiling	3792	m3	1.3
Vinyl floor tiling	8831	m3	0.25
Steel (beam/rebar), 0% recycled content	23932	m3	115

b) Impact of Additional Weight of Roof Materials

1) Staffordshire Blue Tiles

Area weight = 71 kg per m².

<https://www.dreadnought-tiles.co.uk/Staffordshire-blue.html>

2) Standing Seam Metal Roof (coated steel)

Area weight = 7.14 kg per m²

<https://www.tatasteeleurope.com/construction/key-products/colorcoat-urban>

Approx. roof area : 305 m²

Approx. weight of Staffordshire Blue Tiles = 21,655 kg (21.7 tonnes)

Approx. weight of Standing Seam metal = 2,179 kg (2.2 tonnes)

In addition to the significant environmental disadvantage of the clay tile materials, there is an enormous extra weight to be carried if they are used – in this case, almost 20 tonnes extra – which is approx. **10 times more** weight.

We have not yet had formal calculations from a Structural Engineer, however we have received the following advice from specialists in the field :

- a) With the significant extra weight of the roof structure, there will clearly need to be a corresponding increase in the depth of the concrete in the structural floor slab, together with an increase in the width and/or depth of the concrete footings.
Every extra m³ of concrete used is an additional 285 kg of embodied CO₂ per m³
- b) The increase in size of the foundations above will also result in additional excavation, and removal of material from site – again, with further environmental impact.
- c) We are planning to use a factory-manufactured timber frame construction for the main structure of the house; this gives numerous benefits including dramatically improved build quality, energy efficiency and minimising waste during construction.
We are advised by the manufacturers that, for the heavy clay tile roof, they are likely to need to use significantly more structural steel and stronger lintols - every extra tonne of steel used is an additional 3,045 kg of embodied CO₂ per m³.
They are also likely to need timber studding at 400mm centres in their construction, rather than at 600mm centres for the lighter seamed metal roof - this represents a significant increase in the amount of timber used.