Sustainability Statement

12B Keats Grove
Hampstead NW3 2RN

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1.0 Introduction

Concept sketch by Fox Fearnley Landscape Office

1.0 Introduction

This statement sets out the sustainability strategy for the proposed development at 12B Keats Grove, Hampstead, following neighbourhood wide consultation as part of a pre-application process for a new house. The brief is for a low-carbon family home, to replace an existing house. The development site is within the Hampstead Conservation Area and the client also owns the Grade II listed villa adjacent to the application site at 12 Keats Grove. The proposal includes unified biodiverse landscaping which will connect the two houses.

1.1 The Proposed Development

Consent is being sought for:

- Dismantling the existing 1984 house at 12B Keats Grove and re-purposing its materials
- Erecting a new 4-bedroom home to form part of a shared estate with 12 Keats Grove for a large family
- Creating a unified, biodiverse woodland landscape for both properties

1.2 The Project Team

The following consultants form the project team and have contributed to the design proposals.

Architect	51 architecture
Landscape Architect	Fox Fearnley Landscape Office
Planting Design	Noel Kingsbury
Structural Engineer	Price & Myers
MEP Engineer	Seneca
Energy Consultant	eb7
Approved inspector	Regional Building Control
Arboriculturalist	R.Howorth and Co.
Ecologist	Furesfen
Daylight Analysis	Right of Light Consulting
Geotechnical Analysis	Geotechnical and Environmental Associates (GEA)

2.0 Project sustainability goals

The sustainability objectives driving the project can be simplified into seven main pillars:

1. **Sensitive disassembly of the existing building:** maximising on-site re-use of materials and diverting a targeted minimum of 95% of waste from landfill.

2. **Passive design:** the new house will use passive design measures to reduce its operational impacts, including a low heat loss form factor (HLFF) and optimisation of natural lighting and ventilation.

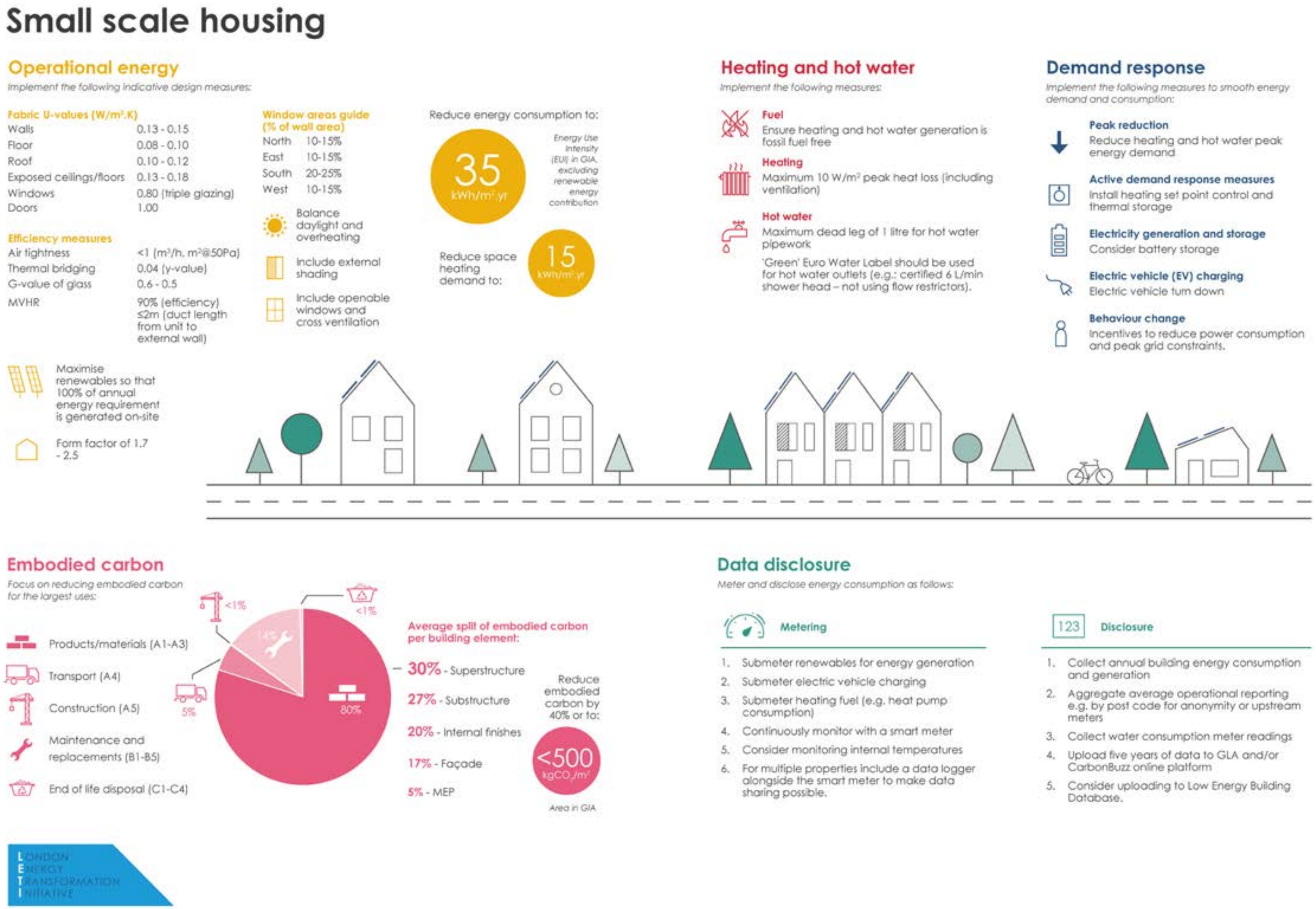
3. **Low impact construction:** the new building is designed alongside life cycle carbon assessment. The project targets a rate of Global Warming Potential (GWP) of 500 kgCO2e per m² of internal area, a reduction of around 34% from the Business as Usual rate as calculated. Efficient use of materials including re-use of existing materials minimises potential wastage.

4. **Low impact operation:** the new building is designed with the input of services specialists to ensure that it demands little energy to run. On-site groundsource heat pumps and a solar array will further decarbonise the operation of the building.

5. **Durable and adaptable architecture:** a building which remains functional for as long as possible will have the lowest environmental impact. The new home is designed to adapt to the client's evolving needs as a lifetime home, as well as to climate destabilisation, through its passive control of the internal environment, with backup from active systems. Resilience to changes in technology is also built-in through accessible servicing, which allows for whole systems to be replaced as necessary while causing minimal disruption to the fabric of the building.

6. **Biodiverse setting:** the proposed unified landscape will maximise connectivity between habitats, acting as a link between the neighbouring green spaces. Meanwhile, the architecture will avoid disrupting the living patterns of non-human neighbours by implementing dark-sky external lighting, and choosing materials which are wildlife friendly.

7. **Low impact end-of-life strategy:** the new building is designed to last for 70-100 years as a minimum, however it will eventually need to be dismantled. As such, it is designed to be largely demountable. Natural building materials have been selected which are non-toxic and can be safely reused, for example brick and ceramic tiles, transformed, for example softwood stud into cellulose board or composted, for example clayboard and wood fibre insulation.



Excerpt from LETI climate emergency design guide: archetype - small housing

3.0 Policy environment

This document has been created with reference to the following policy documents:

- The London Plan 2021
    * Chapter 8: Green Infrastructure and Natural Environment
    * Chapter 9: Sustainable Infrastructure
- Greater London Authority: London Plan Supplementary Planning Guidance
    * Section 8: Green Infrastructure and Natural Environment
    * Section 9: Sustainable Infrastructure
- The Camden Local Plan 2017
- Camden Planning Guidance Adopted Documents and Guidance Notes
- London Energy Transformation Initiative Climate Emergency Design Guide, Embodied Carbon Primer and Carbon Target Alignment

Although no instructions for certification have been issued, the project has taken cues from the Building Research Establishment Home Quality Mark schema, HQM1, with a view to achieving the equivalent of an HQM Excellent rating.

3.1 The London Plan: Energy Hierarchy

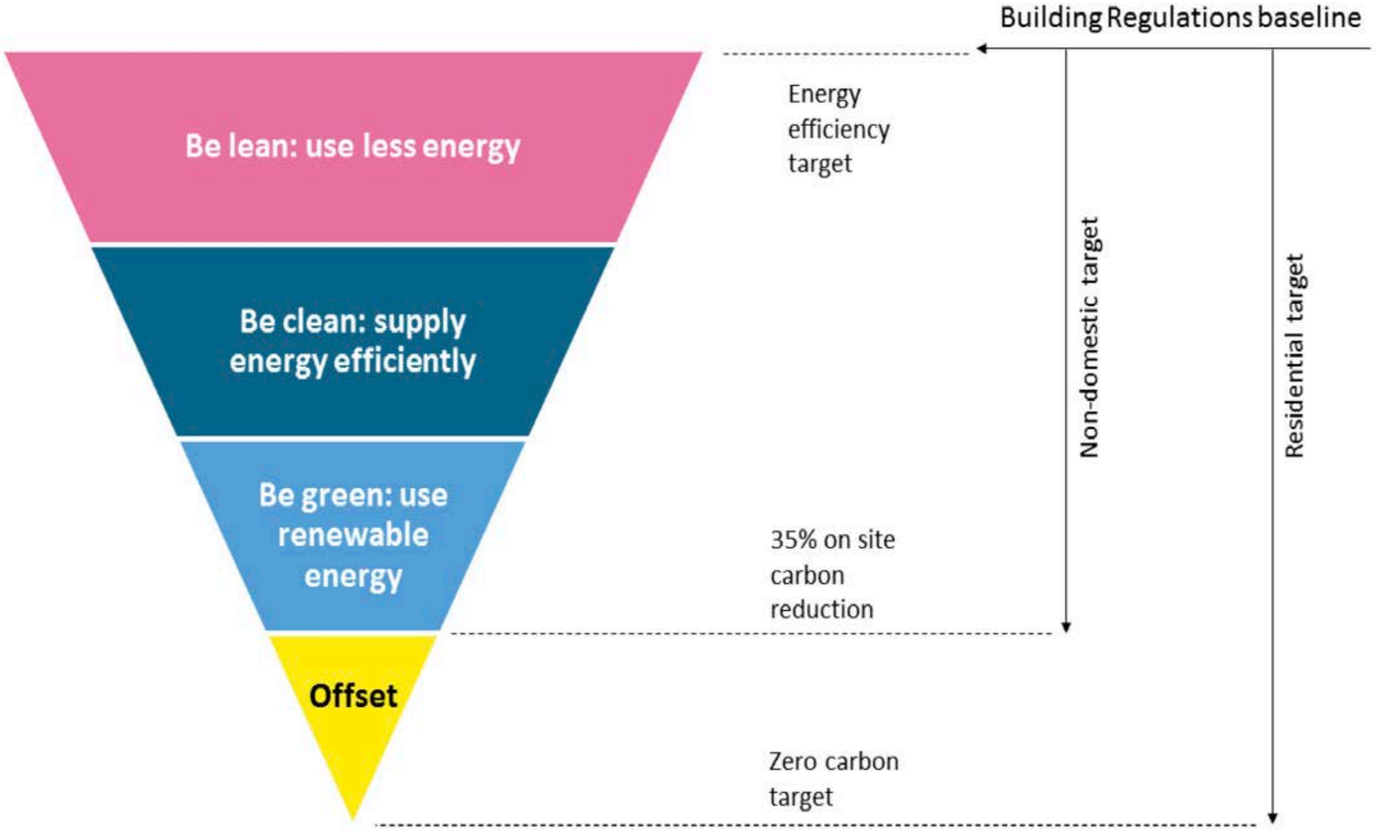
The proposed development at 12B Keats Grove has been designed to achieve the highest of environmental performance standards, following the Energy Hierarchy as set down by the London Plan and the London Borough of Camden's relevant policy documents.

A 'Lean, Clean, Green' approach has been adopted for assessing energy and thermal comfort needs and appropriate solutions devised following the guidance under Chapter 9 of The London Plan and the latest GLA guidance (April 2020).

The proposed new dwelling has adopted the highest level of passive design standard from the outset, incorporating sustainable, low carbon materials.

The development achieves an overall improvement (Building Emissions Rate / Target Emissions Rate) in regulated emissions of >71.97% on the Part L 2013 standard and a reduction in overall emissions of >49.85% when taking into account unregulated energy use. This is achieved through high standards of insulation, efficient ground source heat pump driven heating and hot water systems and a roof mounted solar array.

The reduction in regulated emissions achieved through the use of renewable and energy generating technologies is over 61.99%. Please refer to the sustainability consultants' Energy and Sustainability Statement attached to this application for further information.



The London Energy Hierarchy

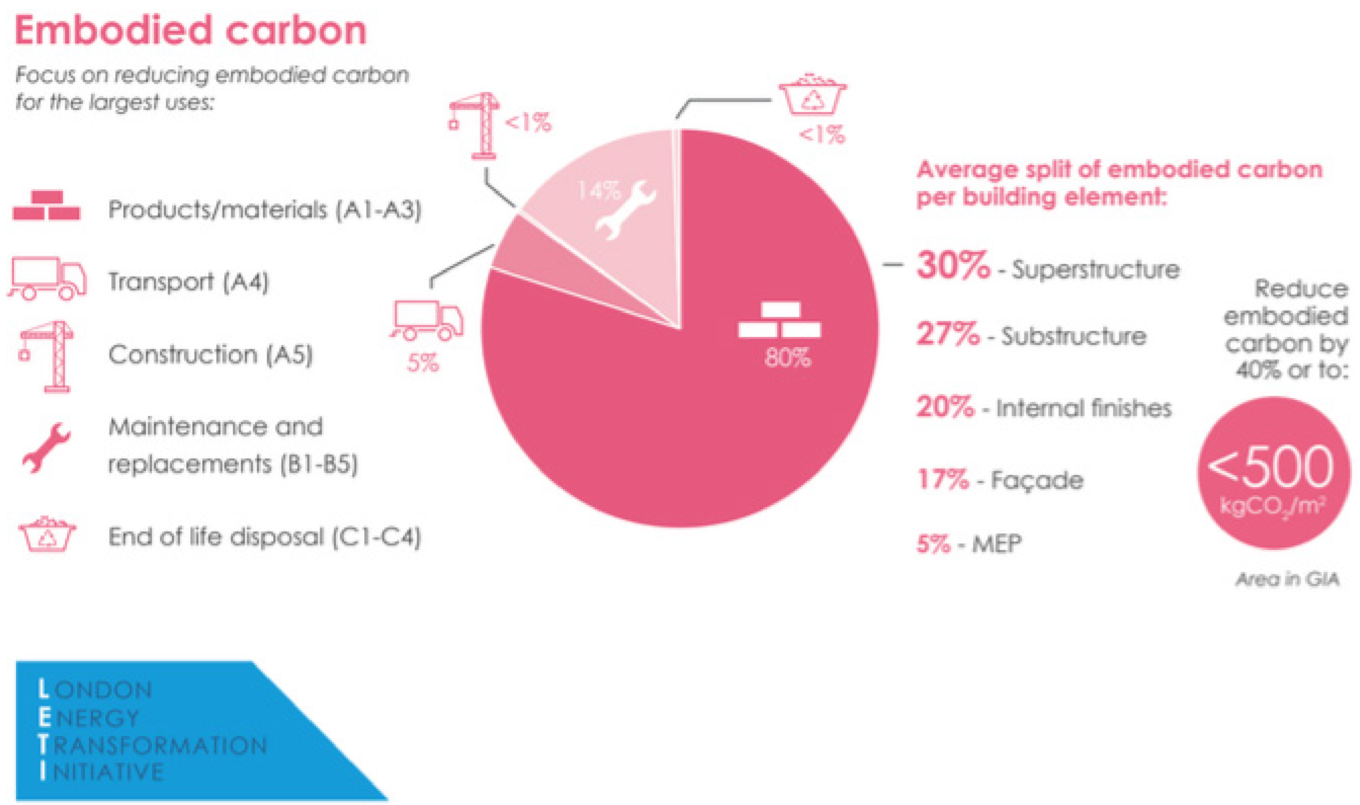
3.2 The London Plan: Carbon

Chapter 9: Sustainable Infrastructure, paragraph 9.2.1 of The London Plan 2021, recognises that current UK building regulations only affect the operational portion of a project's environmental impacts, and that *"To fully capture a development's carbon impact, a whole life-cycle approach is needed to capture its unregulated emissions (i.e. those associated with cooking and small appliances), its embodied emissions (i.e. those associated with raw material extraction, manufacture and transport of building materials and construction) and emissions associated with maintenance, repair and replacement as well as dismantling, demolition and eventual material disposal)."*

Camden Borough Council declared a Climate Emergency in 2021 and requires Whole Life Carbon Assessments for all major projects.* Whilst 12B Keats Grove is considered non-major and non-referable, due to its local sensitivity and importance, the clients have commissioned a Life-Cycle Carbon Assessment (LCA) to monitor and record the embodied impacts of the project, which will complement the appraisal of the building's operational impacts. These assessments will be integrated and externally certified for compliance with BS EN 15978.

This assessment demonstrates the commitment of the client and design team to ensuring the project achieves exemplary sustainability. The team sees the project as setting an intention for a new way of working, which takes all environmental impacts into account. Please refer to the working LCA document which is attached to this application for further details.

* Camden Climate Action Plan 2020-2025, p. 26 'Buildings', Camden Borough Council, London, 2020



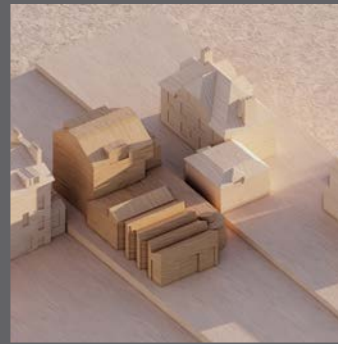
Excerpt from LETI climate emergency design guide: archetype - small housing

4.0 Operational impacts

Equinox 9am

Equinox 12 noon

Equinox 3pm



Equinox 6pm

Summer Solstice 9am

Summer Solstice 12 noon

Summer Solstice 3pm

Summer Solstice 6pm

Winter Solstice 9am

Winter Solstice 12 noon

Winter Solstice 3pm

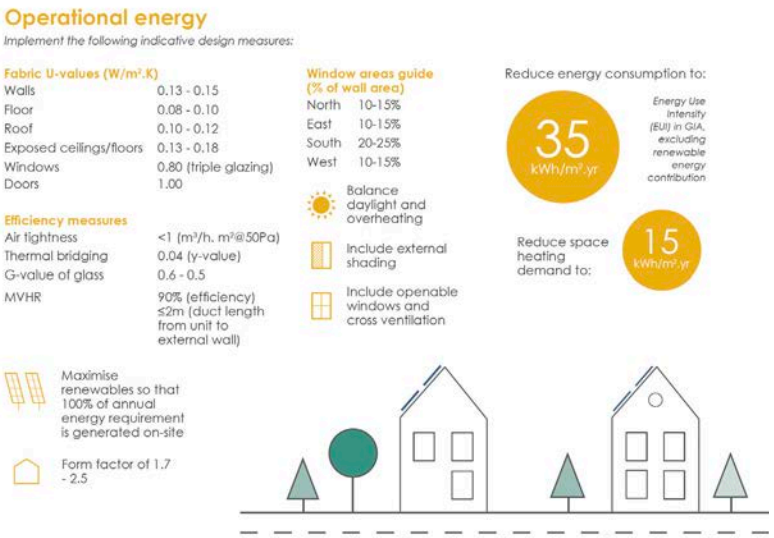
Seasonal sun studies to inform passive design

4.0 Operational impacts

The LCA scope used excludes modules B6 and B7 which deal with operational impacts. This is because these impacts are being separately assessed by Sustainability Consultants eb7, whose findings are contained in the Energy and Sustainability Statement attached to this application. The findings of the Sustainability Statement will be added to the LCA to complete the scope prior to the external certification of the LCA.

The design uses passive strategies to reduce operational impacts throughout, and build-ups conform to LETI's* recommended domestic standards for energy efficiency.

* LETI Climate Emergency Design Guide, Archetype Pages: Small Housing, LETI, 2020 https://www.leti.london/cedg



Tables 6 & 7 Demonstrate how the Keats Grove project complies with the London Plan requirements and the new GLA guidance relating to zero carbon development.

Table 6 – Carbon Emission Reductions – Domestic Buildings

Key	Tonnes/annum
Baseline CO_2 emissions (Part L 2013 of the Building Regulations Compliant Development)	8.60
CO2 emissions after energy demand reduction (be lean)	6.34
CO2 emissions after energy demand reduction (be lean) AND heat network (be clean)	6.34
CO2 emissions after energy demand reduction (be lean) AND heat network (be clean) AND renewable energy (be green)	2.41

Table 7 – Regulated Emissions Savings – Domestic Buildings

	Regulated Carbon Dioxide Savings	
	(Tonnes CO2 per annum)	%
Savings from energy demand reduction	2.26	26.28
Savings from heat network	0.00	0.00
Savings from renewable energy	3.93	45.70
Total Cumulative Savings	6.19	71.98
	(Tonnes CO_2)	
Carbon Shortfall	2.41	
Cumulative savings for off-set payment	72.3	
Cash-in-lieu Contribution	**£N/A**	

Excerpts from LETI climate emergency design guide: archetype - small housing and eb7 SAP calcs

4.1 Water use

The development minimises water use as far as practicable by incorporating appropriate water efficiency and water recycling measures.

The new building will meet the required level of 105 litres maximum daily allowable usage per person in accordance with Level 4 of the Code for Sustainable Homes.

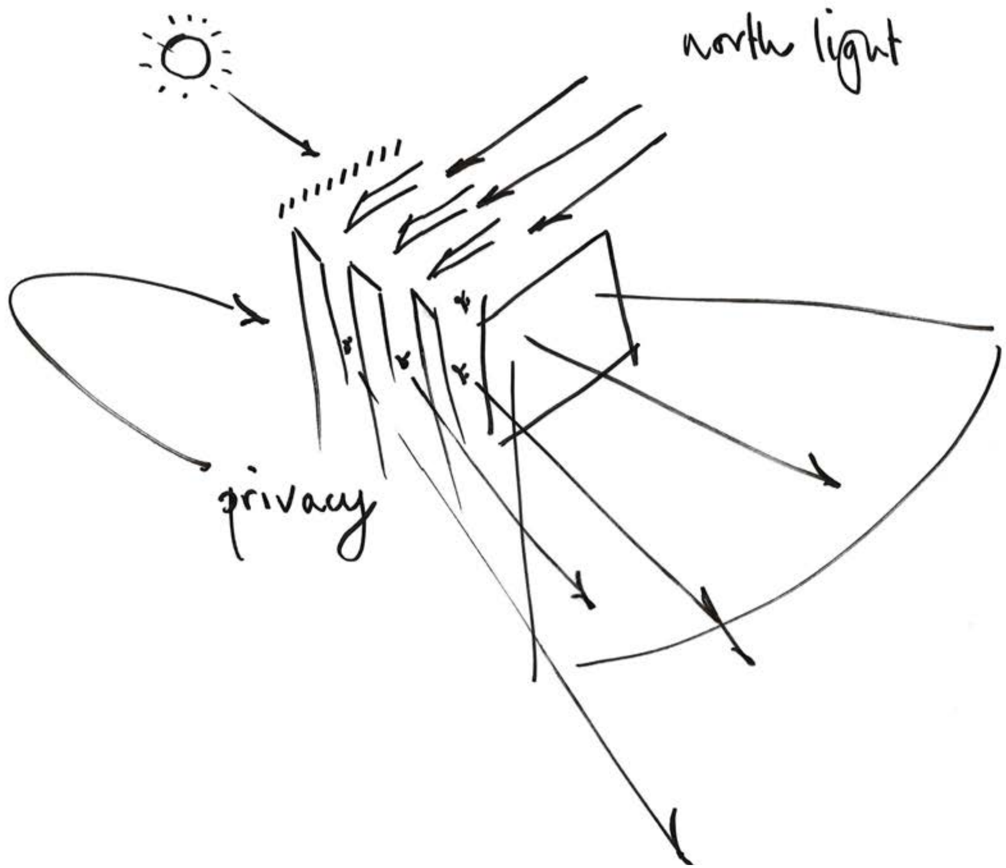
Please refer to the sustainability consultants' Energy and Sustainability Statement attached to this application for further information.

4.2 Energy use

SAP outputs demonstrate that the building achieves an overall improvement in emissions on the Building Regulations Part L standards for regulated emissions of 71.97%.

This is reached via passive design minimising the need for operational energy use, along with renewable energy generation from solar panels and ground source heat pumps.

Please refer to the sustainability consultants' Energy and Sustainability Statement attached to this application for further information.



5.0 Embodied impacts

5.1 Introduction to LCA

Life cycle carbon assessment (LCA) is being carried out by 51 architecture using software created by eTool. Embodied impacts are the environmental impacts of the extraction of raw materials, their transport, transformation and manufacture into products, their transport to the site and the energy used to apply them in construction.

These impacts are calculated in terms of carbon dioxide equivalent emissions generated from the point of material extraction (the “cradle”) to the point where the building is completed and occupied (the “gate”) and from the gate to the point at which the building is dismantled (the “grave”).

Impacts beyond the boundary of this scope are captured separately as module D of the LCA, including those which relate to reuse potential of building elements. This is “cradle to cradle” assessment, in line with the circular economy approach taken by the project team. The impacts are then divided by the internal area of the building as defined by RICS to provide a rate of Global Warming Potential per square metre.

A business as usual (BAU) or baseline assessment was carried out for the architectural impacts of the project at Stage 2, using details of generic construction materials. This was combined with a BAU assessment of the structural components, which was carried out by structural engineers Price & Myers.

The outcome of the combined BAU modelling was a rate of around 760 kg CO_2e/m^2 of which 315 kg CO_2e/m^2 derived from structural elements (slabs, beams and primary structure) and 445 kg CO_2e/m^2 resulted from architectural elements (cladding, insulation, waterproofing, internal finishes, architectural products).

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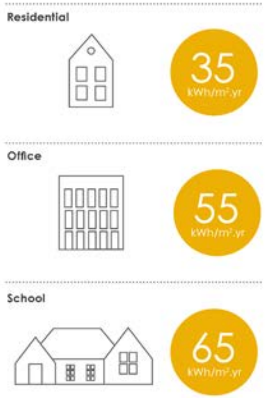
Appendix 9
Whole life carbon

This report has focused mainly on the reduction and calculations surrounding embodied carbon. Whole life carbon (WLC) includes embodied carbon and operational carbon-carbon emissions associated with daily energy use. The purpose of using WLC is to move towards a building or a product that generates lowest carbon emissions over its whole life stages (sometimes referred as 'cradle-to-grave').

9.1 Operation carbon

Operational carbon relates to carbon dioxide and other greenhouse gases associated with the in-use operation of the building. This usually includes carbon emissions associated with heating, hot water, cooling, ventilation and lighting systems as well as energy used in cooking, equipment and lifts.



Clear targets for operational energy for various building types, and advice on how to achieve them are found in Chapter 1 of the Climate Emergency Design Guide.

This report focusses on actions to reduce embodied carbon. Below is a list of strategies to reduce the operational carbon of buildings. For more information see the LETI Climate Emergency Design Guide.

9.1.1 Actions to reduce operational carbon

→ **Fabric:** High performance fabric and airtightness – Space heating should be no more than 10 W/m² in peak design conditions (- 4 degrees celsius).
→ **Form:** Compact form factor
→ **Glazing:** Sensible glazing ratios with appropriate orientation and external shading.
→ **Heating and hot water:** A fossil fuel-free efficient heating and hot water system.

SIGNPOST *Climate Emergency Design Guide Chapter 3: Future of heat*

→ **Ventilation and cooling:** Mechanical ventilation with heat recovery providing fresh air in Winter with natural ventilation in summer. Design out cooling where possible.
→ **Lighting:** Efficient lighting with appropriate controls.

SIGNPOST *Climate Emergency Design Guide Introduction - Building archetypes*

Excerpt from LETI climate emergency design guide

5.1 Introduction to LCA. cont'd

The minimisation of the amount of concrete needed was a priority for the engineering team from the early stages.

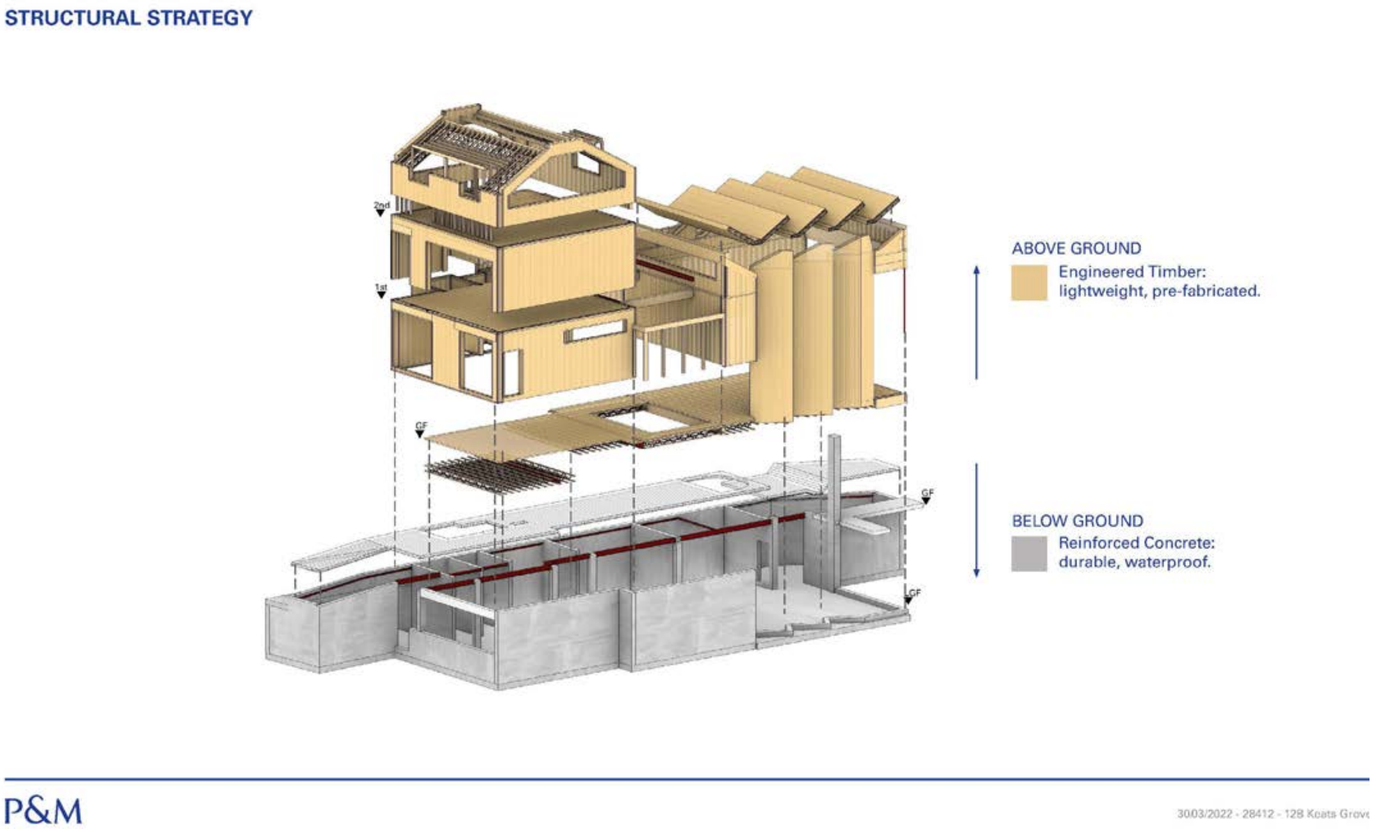
At this stage of the design, the structural scheme was more developed than the architectural scheme and significant steps to reduce the structural impacts had already been designed, including a construction sequence allowing for only one side of the lower-ground floor to require a retaining wall, and dividing the upper-ground floor slab between concrete and timber joists. Because of this, the team recognised that greater impact savings were more likely to be possible in the architectural count.

A combined target for the rate of embodied GWP for the project was set at 500 kg CO_2e/m^2.

This improves on the RIBA 2030 Climate Challenge parameters which recommend that residential projects target embodied GWP rates > 800 kg CO_2e/m^2 in 2025, falling to > 625 kg CO_2e/m^2 by 2030.

This ambitious target is intended to push the design to the most sustainable configuration and construction possible on the site, something which the client and design team are committed to.

Please see the attached LCA document for full details of the target setting process.



5.2 Material Statement

The materials strategy for the project has been guided by the London Plan Energy Hierarchy: Be Lean, Be Clean, Be Green.

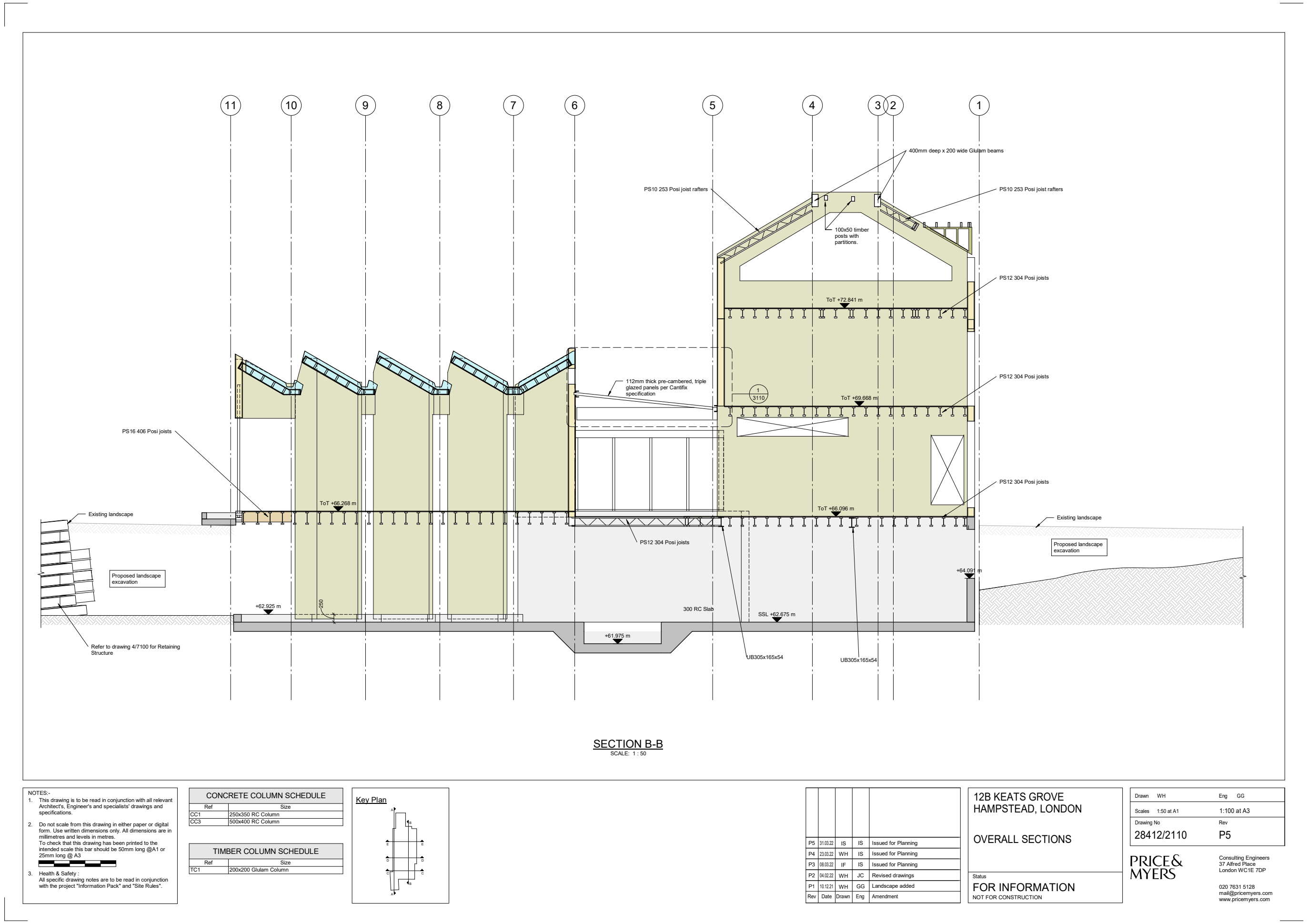
Be Lean: iterative collaboration between the design team and the structural and service engineers has allowed an efficient structural strategy which recognises that the most effective way to reduce embodied impacts is to avoid using surplus material.

By choosing materials and details with long service lives, the embodied impacts of those materials specified are distributed over a longer time period, minimising their rate of GWP.

The design has taken dimensions of available materials into account, ensuring that their full dimensions as supplied are used wherever possible to reduce wastage. A design for manufacture and assembly (DfMA) approach has been taken, with major wall components designed to be manufactured off-site as cassettes. This workflow improves construction efficiency.

Be Clean: consideration of construction methods and the associated need for plant use on site is informing a construction strategy which aims to reduce energy consumption, air pollution, light pollution and noise pollution during the disassembly of the existing building and construction of the new one.

Additionally, materials and details with low-impact maintenance requirements are being selected over those which require more intensive servicing.



5.2 Material Statement, cont'd

Be Green: materials with lower extraction and manufacturing impacts are being prioritised in the scheme. This means choosing materials which are natural, store biogenic carbon, are biodegradable, or are already recycled. Design for disassembly and ease of maintenance are being prioritised through simple junctions and details which will make the reuse of building elements more feasible at the end of the building's life.

Be Seen: Environmental Product Declarations (EPDs) are being sought from manufacturers wherever possible and will be added to the project LCA. Materials with EPDs available are being preferred. Where manufacturers have not yet produced these data, next nearest materials are being used for calculation purposes. In at least one case, a manufacturer has performed feasibility studies on instructing EPDs across their entire product range as a direct result of the conversations had around this project.

The building is supported by a composite structure: at lower ground floor level a concrete retaining wall to the western boundary is propped by concrete buttresses and capped by a comflor floor plate. The comflor is a composite concrete and steel product used to improve material efficiency.

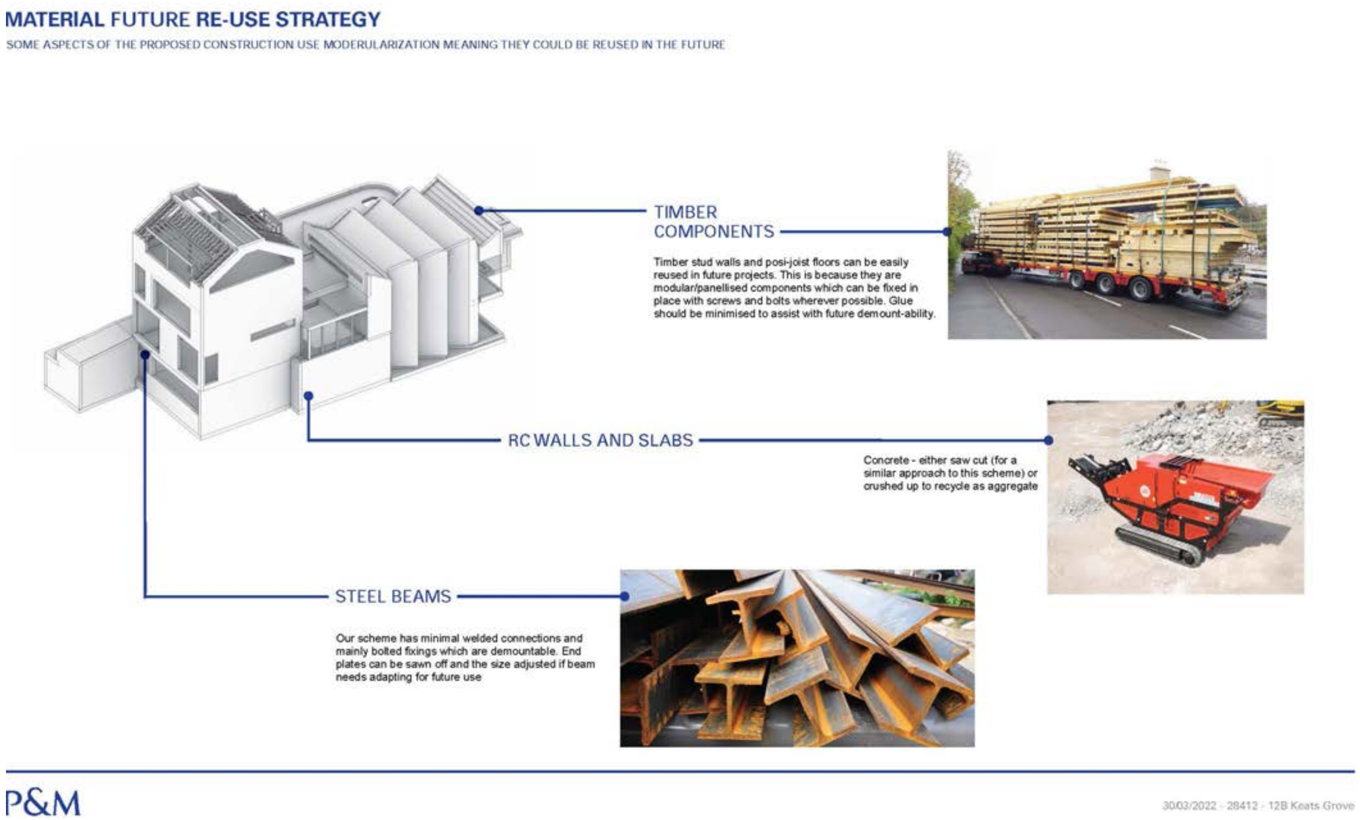
On the eastern side of the building the external ground level is lower so less retaining structure is required. For this reason, a timber floor deck is used on this portion of the upper ground floor.

The lowest floor is insulated with foamglas and finished with british stone tiles. The concrete retaining walls are internally wrapped with 125mm foamglas insulation, aiming for a u value of max 0.12 W/m2K.

The majority of the building is timber framed with some concrete columns concealed within the walls at lower ground floor level.

The external walls are insulated with 260mm wood fibre insulation of which 200mm is contained within the 200mm studwork, forming a service void, and the remainder is attached as a board. These walls achieve a u-value of max. 0.15 W/m2K, while the windows and doors meet max. u values of 0.8 W/m2K. The roofs are all insulated with wood fibre to achieve max. u values of 0.13 W/m2K.

Thermal bridging is designed-out throughout the scheme, with foamglas creating thermal breaks in the concrete areas and all pipework and ducts to external services being highly insulated.



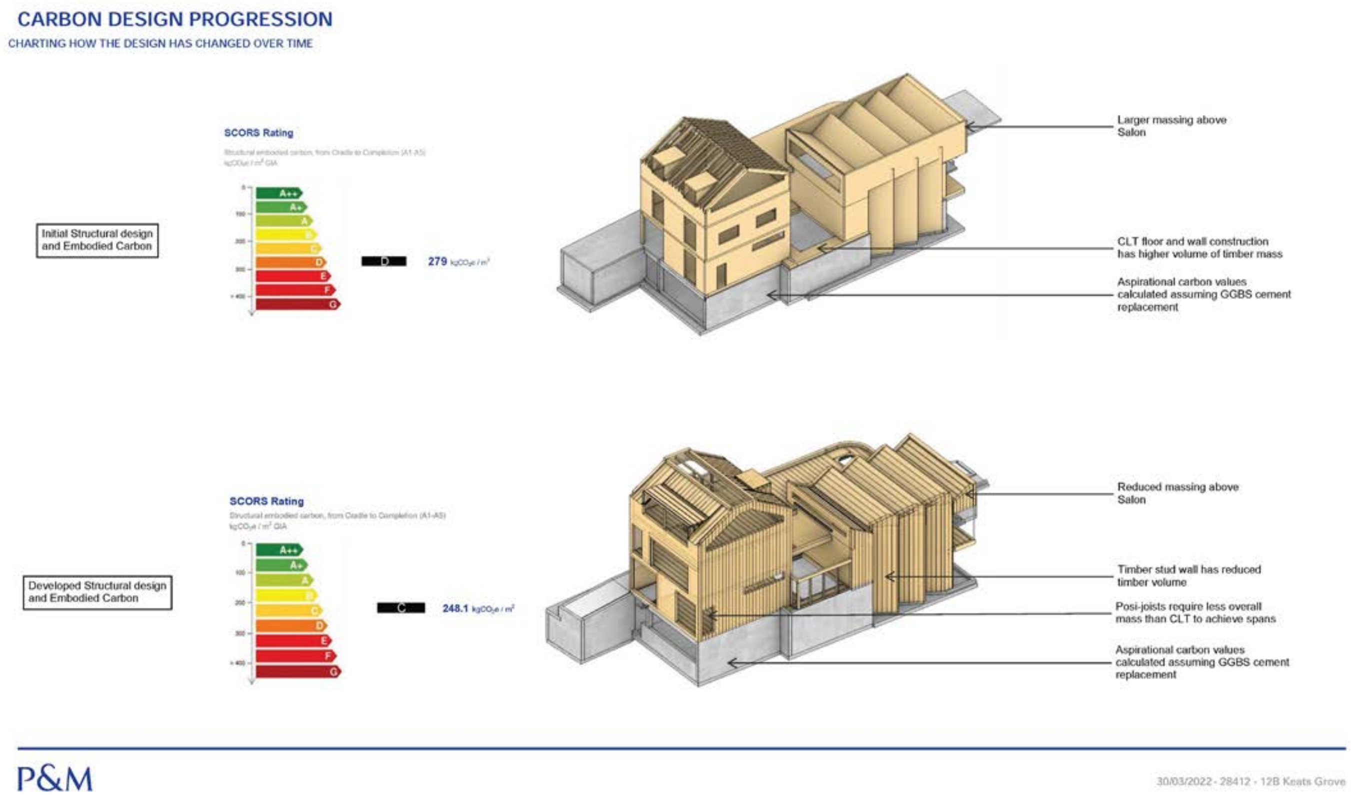
5.3 Natural materials

The client is focussed on creating a sustainable building with a healthy internal environment for the occupants and a healthy external environment for the natural surroundings.

One way this is being achieved is through extensive use of natural materials. The primary construction is a timber frame, with bespoke wall cassettes. The timber structure is relatively light and requires less substructure than a heavier frame. The cassettes will be fully insulated with wood fibre insulation manufactured as a by-product of forestry, and will achieve a Passivhaus compliant u-value. The outer leaf will be protected by a facade of handmade clay bricks, while the inner leaf will be detailed in clayboard, clay plaster and clay paint.

Wood fibre insulation products have around one sixth of the embodied carbon of conventional synthetic insulation. They also avoid off-gassing of VOCs which are released by synthetic products. They are permeable and passively regulate the internal humidity via a natural humidity gradient. These products are non-toxic and fully biodegradable and have a range of post-use pathways from composting to re-manufacture.

All wood products contain sequestered biogenic carbon which is prevented from re-entering the atmosphere as long as the wood remains intact.



5.3 Natural materials, cont'd

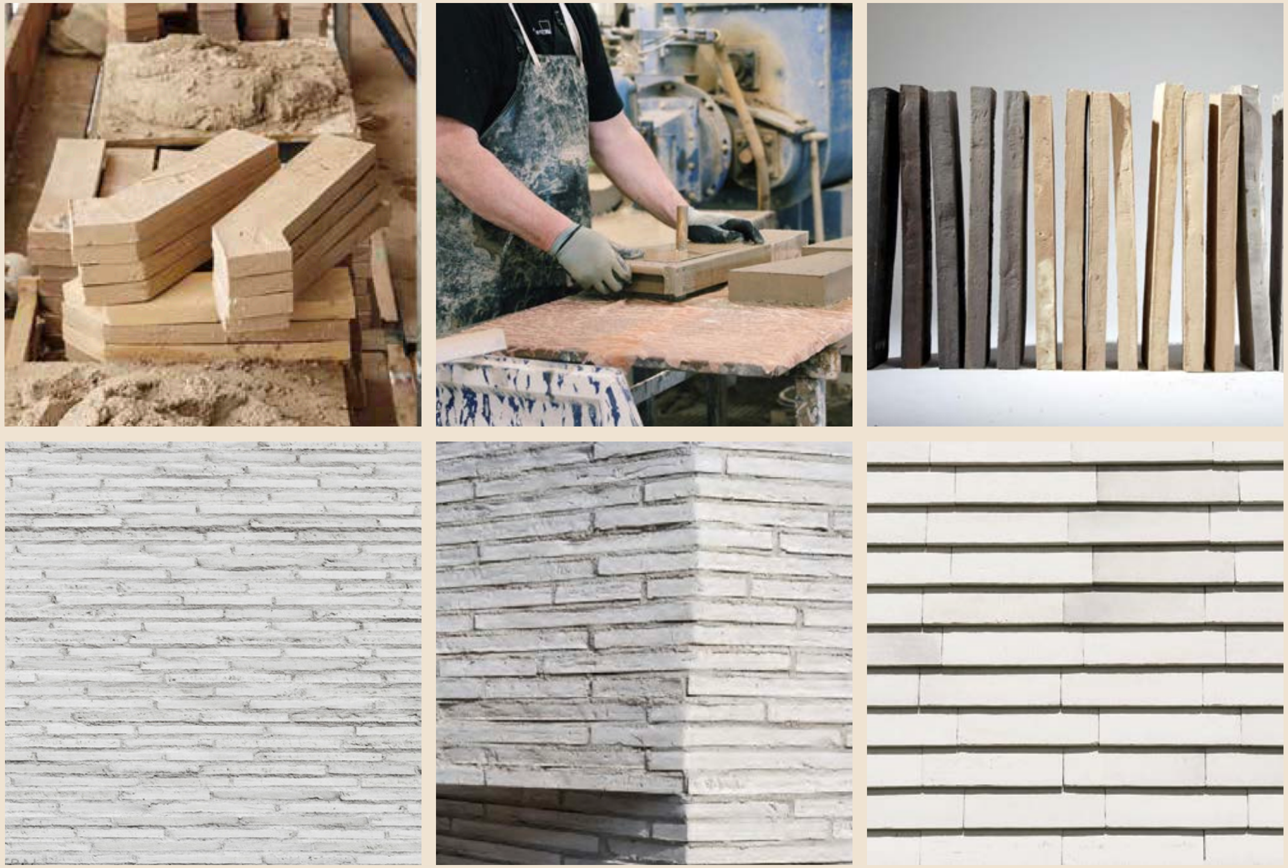
Alongside timber, clay is a key part of the materials palette for the project. The clay bricks specified for the façades are made entirely from natural components: clay, sand and other mineral inclusions for pigment. The manufacturer Petersen Tegl explains why their bricks in particular are a sustainable choice:

"To extract clay, the topsoil and upper layers of earth are removed and put aside. After the clay has been extracted, these layers are put back so that the site can again be used for farming or other purposes. Usually, there are no visible signs that clay has been extracted from an area, except that the field may be 1–2 metres lower down than it was before. The process of extracting clay has no negative effect on the soil or groundwater.

Petersen Tegl uses all of the clay it extracts in its production process. If anything goes wrong, the clay and brick are recycled. Since 2015, the volume of water used in production has decreased by 75 %, and all water used in the process is recycled. During production, heat from the ovens is redirected to dry bricks prior to firing. This means that the heat energy generated is used twice."

The brick is also self-finished, requiring no maintenance or paint. Although rated for a service life of 100 years, these bricks can last for many centuries.

If the bricks were to be removed from the building at some future point, for example in disassembly, they would likely be suitable for re-use in their current form. Alternatively, they can be safely crushed, recycled and re-manufactured as new bricks. Any brick waste is inert and non-toxic to the environment.



5.3 Natural materials, cont'd

Petersen Tegl note that *"brick has a beneficial effect on the indoor climate as brickwork emits no gases, smells or other emissions. It also absorbs sounds and vibrations, regulates heat, diffuses water, assists drying after water damage, and provides no nourishment for micro-organisms, meaning that it rarely develops mould."* These attributes make the brick an ideal companion to the other natural materials specified, in creating a healthy internal environment.

Clay board is an alternative to plasterboard, developed to avoid the high-impact manufacturing processes of plasterboard, which requires gypsum extraction and heating. Plasterboard also requires specialist monocell landfill disposal at the end of its life, and can contribute to off-gassing in buildings depending on what additives are used. Clay board uses clay in place of gypsum, which has lower manufacturing impacts and is also safer to install than plasterboard. Clayboard is also permeable and contributes to passive regulation of internal humidity, while protecting structural elements from damage which can be caused by trapped moisture. Like clay brick, clay board is non-toxic and can be safely recycled or composted.

Clay boards also have a high thermal mass and excellent acoustic absorption. They contribute to the passive thermal regulation of the building, which is key to the minimisation of operational impacts, while an internal wall faced in clay boards and insulated with wood fibre performs four times better than a solid concrete wall in terms of acoustic insulation.

The logical finishes to complete this build-up are clay plaster, and clay paint. Both are extremely low-impact in manufacturing, completely inert, non-toxic and breathable, maintaining the integrity of the passive moisture regulation in the rest of the construction.

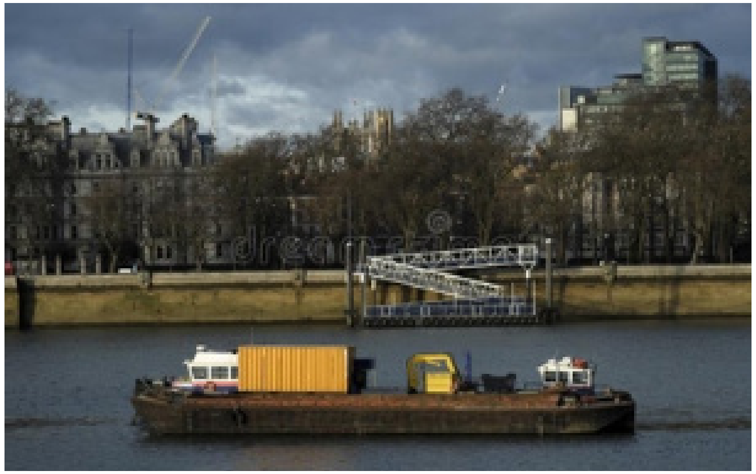
5.4 Note on sourcing

Manufacturing processes, proximity of suppliers and methods of supply are all factors which affect the embodied impacts of a material or product, and have therefore been taken into consideration during specification.

Products which are domestically produced have been prioritised, as have those which contain recycled content, or are by-products. The team wishes to support the expansion of sustainable forestry for construction as an industry which will contribute to mitigation of the climate crisis, by selecting timber products from sustainable sources.

Timber products will be acquired from sustainably managed forests, in order to allow sequestration to be factored into the whole life carbon assessment of the project. Please refer to the Life Cycle Carbon Assessment document attached to this application for full details of scope and module boundaries.

The bricks will be made in Denmark however the team aim to make use of international and inland water freight as a low-impact means of transport for these. The Thames' potential for conveying construction materials has been described by the Institute of Civil Engineers as an untapped asset. Inland water freight is also being considered for other project materials as a means of reducing road transit and associated impacts.



5.4 Note on longevity and adaptability

Since the service life of each building element is effectively capped by the service life of its least durable component, robust detailing is extremely important when designing a lasting building. This new building is proposed to replace a thirty-eight year old building, of which some crucial elements have already started to fail. Since retrofit was not feasible in this case, it is imperative that the replacement building has a long, useful life. This requires structural durability, architectural durability and flexibility, ease of maintenance and ease of adaptation.

In addition to specifying materials and details which are long-lasting and resilient to failure, the design anticipates the changing living patterns of its occupants over time, as well as the evolution of technology. Future adaptations to the layout of the building are facilitated by a simple structural grid and regular servicing intervals in the building fabric, along with simple, timber construction which is easier to augment or change as necessary than other systems*.

The layout of services allows access for maintenance and eventual replacement of systems with more efficient ones as future technologies become available.

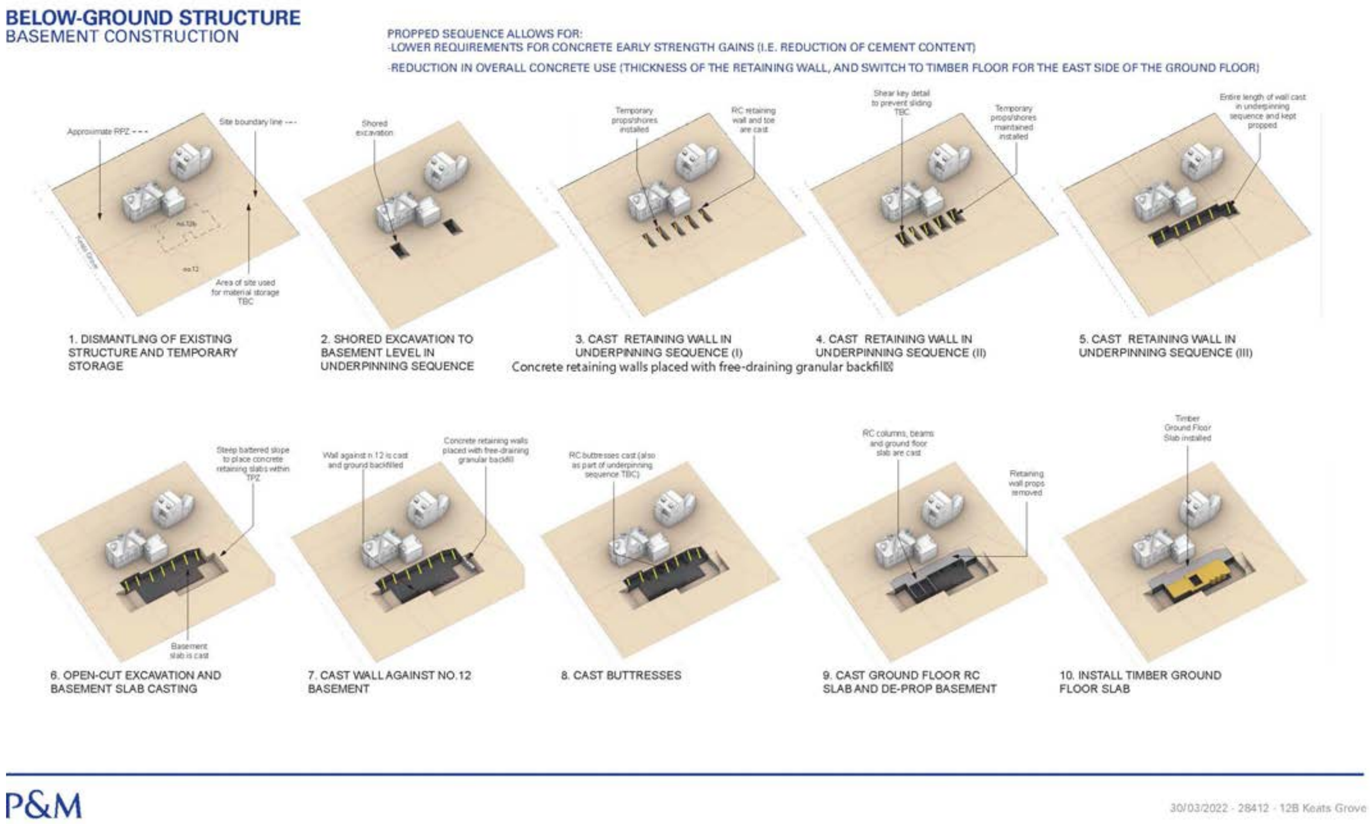
When combined, these features maximise the potential useful life of the building, thereby minimising its rate of GWP. The designed longevity also safeguards the proposed landscape which includes many trees with long projected life spans - these are free to mature and contribute positively to the local biosphere, free from the risks caused by construction of a replacement building should the new one cease to function.

*with the exception of steel framing, which was avoided due to its high embodied impacts.

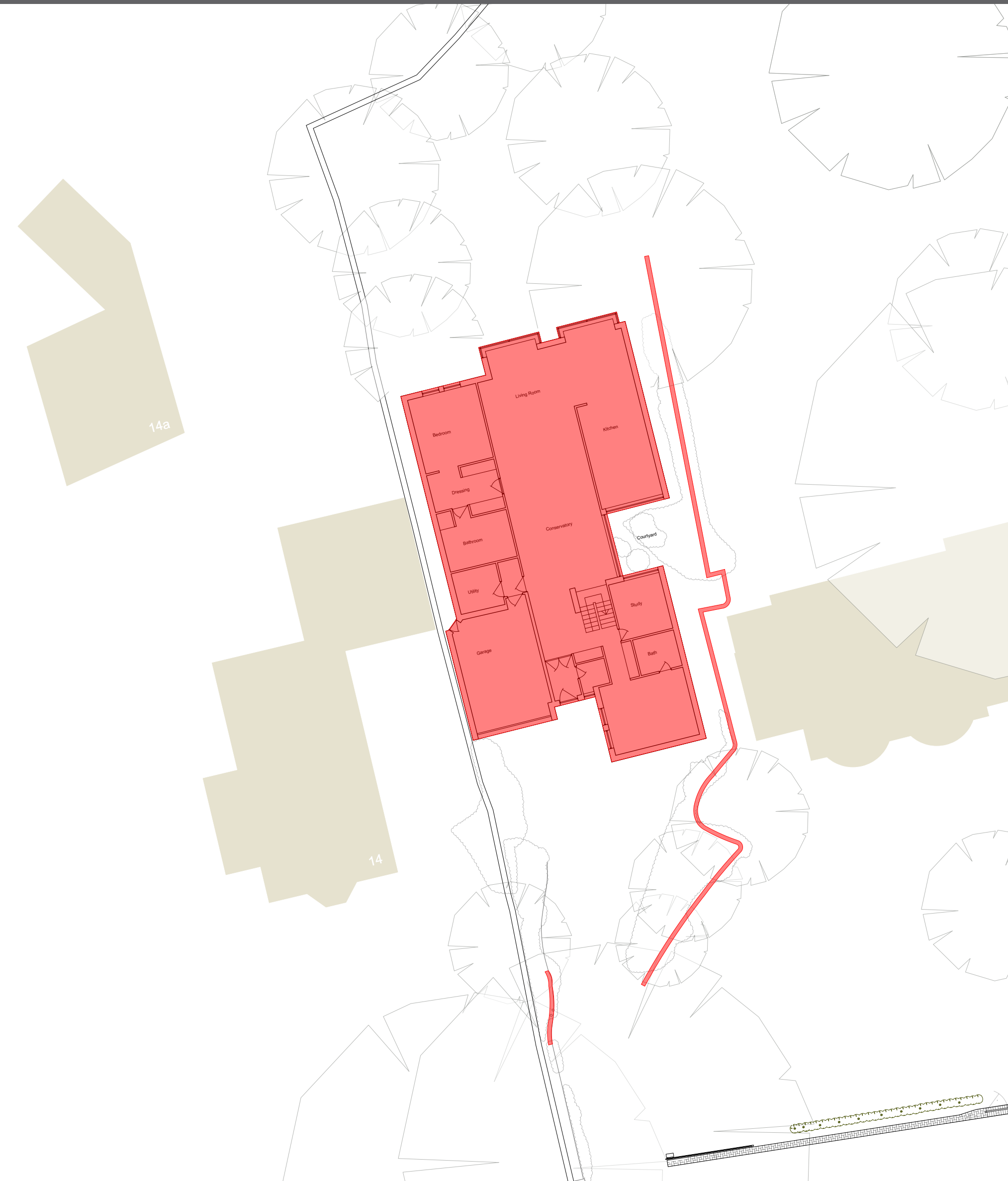
5.5 Note on site works

A Construction Management Plan will be followed to ensure sustainable on-site methods are used, including optimisation of procurement to avoid wastage, supervision of works from an arboriculturalist to safeguard site trees and monitoring of on-site energy consumption.

Please refer to the sustainability consultant’s Energy and Sustainability Statement, page 23, for further information.



6.0 Disassembly and waste hierarchy



Dismantled element	Proposed destination
RC foundation slab	Cut into blocks, reused on-site in landscape
Masonry bricks	Cut into panels, reused on-site/ off-site
Roof tiles	Off-site reuse
Roof timbers	Off-site reuse
Excavated soil	Off-site reuse - clay

6.1 Disassembly strategy

A Site Waste Management Plan and Procurement Plan will be followed to ensure the waste hierarchy, Reduce, Reuse, Recycle, is followed during the deconstruction of the existing building and construction of the new one.

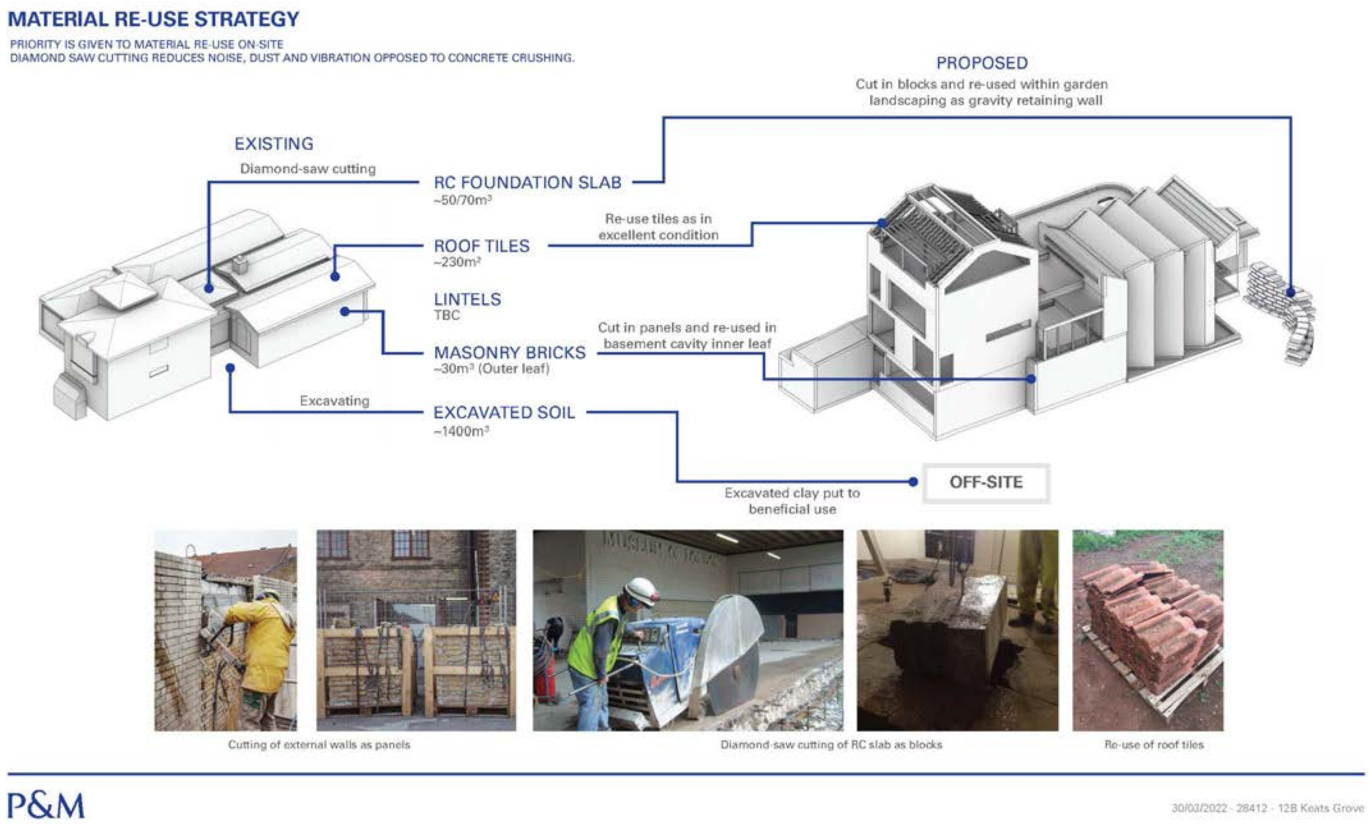
Please refer to the Sustainability consultant's Energy and Sustainability Statement, page 23-24, for further information.

The impacts of demolition of the existing building on site will be minimised through the careful dismantling of the existing structure.

A bill of materials will be used to track the various elements as they are processed in accordance with the waste hierarchy.

The demolition strategy for the project follows the hierarchy:

- On-site reuse
- On-site recycle
- Off-site reuse
- Off-site recycle



6.2 Material reuse and transformation

Major components of the existing structure including the reinforced concrete slab and brick walls have been identified as suitable for on-site reuse.

The concrete slab will be cut with a diamond saw to minimise damage to the material. Water will be used to eliminate dust during processing, and a minimum number of cuts will be made to transform the material for its new use, reducing energy consumption.

The brickwork is jointed with cement, making it unsuitable to reuse as individual bricks. It will therefore be cut into panels in the same way as the concrete slab, and reused in the inner leaf of the lower ground floor concrete retaining walls, thereby also reducing the amount of concrete needed.

Other materials will be assessed for condition and reuse potential, and directed according to the demolition hierarchy.

6.3 Material networks, diversion from landfill

Where on-site reuse or recycling is not possible, dismantled materials will be directed to off-site reuse and recycling. Priority will be given to local uses, and those which require less energy to transform the material.

The project team aims to connect the site with local material reuse networks through partners and collaborators.

A minimum of 95% of dismantled materials will be diverted from landfill, in accordance with The London Plan 2021.

7.0 Maintenance and end of life

The architecture and detailing now being developed by the team is influenced by the need to allow for servicing.

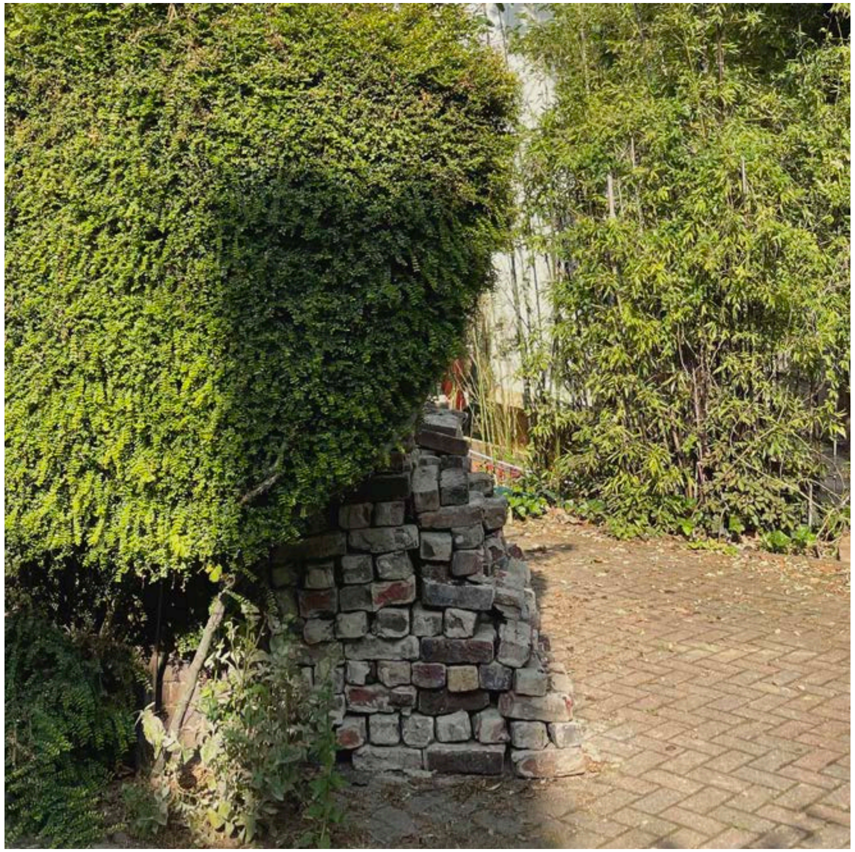
A simple servicing strategy groups wet and dry elements separately, while providing access for maintenance and eventual replacement.

Ease of maintenance is a factor in determining the service life of a building, therefore it is crucial to the minimisation of embodied impacts that maintenance is considered at all stages.

Self-finishing materials like brick contribute to a light maintenance load, while other components are designed in such a way that they can be accessed, reconfigured and dismantled in the future.

The new building is detailed to allow maximum reuse potential, with mechanical fixings being chosen over glued ones for example.

Products which would not be reusable in their original form such as the lime mortar between the clay bricks, the clay plaster and clay paint are deliberately selected as they are inert and do not present an environmental hazard when removed as long as dust-safe processing is observed. They can be safely composted or used as soil additives.



8.0 Landscape sustainability strategy

8.1 Biodiversity and habitats

The existing garden at 12B Keats Grove is small and mostly laid to lawn, which is of low biodiversity value.

The proposed garden, which will be of a woodland type, includes eight new trees (four of which are in replacement of trees currently on site), and a nature pond.

Elsewhere the garden will be planted to a design by Noel Kingsbury using a series of randomised mixes adapted to the specific conditions of the site, particularly shade and humidity. These mixes follow Noel's technique of 'ecological naturalistic planting' which he has perfected over twenty years of practice, writing and research.

The new retaining walls in the garden will be planted with climbing plants. Most importantly the garden is designed as a linking piece to the garden at no.12, the surrounding gardens, and the heath beyond. As such it is a small linking piece of green infrastructure and derives its value as much through this linking role as its contents.

Lighting has been kept to a minimum due to the presence of bat routes over the site.

An ecologist is already on board and has assessed the on-site habitats to advise what needs to be protected, and inform the team on areas of potential biodiversity gain, how to maximise habitats and mitigate habitat disruption during construction. Please refer to the preliminary ecological appraisal attached to this application for further details.

The natural materials palette of the building has also been chosen to avoid any potential harm to wildlife caused by ageing synthetic materials.

8.2 Hard landscaping

Two types of hard landscaping are proposed: Caithness stone set on edge. We believe this to be a sustainable choice for the following reasons:

Firstly, the material is stone with less embodied energy than processed materials such as brick or concrete. The stone is sourced in the UK therefore having covered less miles in transit.

Secondly the stone is in fact a waste product, the offcuts from flagstone production at the quarry. As such the embodied energy created by the process of cutting is already finished and the stone is supplied and laid 'as is', effectively in flakes laid vertically.

Thirdly the proposed construction technique is entirely cement free and devoid of additional geotextile layers (usually placed to suppress weed growth whereas this scheme promotes growth of plants). The lack of cement reduces embodied energy but will also enable the stone to be lifted and reused in the medium term or at any point in the future. Thus forming part of a 'circular economy' strategy.

Fourthly, again considering the build-up of the paving the design is completely permeable, free draining and SuDS compliant. Thus any water hitting the hard landscape will be returned directly to the ground, and to groundwater, rather than being added to the overstrained drainage system.

Permeable pavements have the added benefit of removing a wide range of pollutants from surface water runoff as they are either retained on the pavement surface or flushed into the granular sub-base where they become trapped and are degraded over time.

It is proposed that permeable paving be used for external hard landscaping spaces at both the front and rear of the property.

For lower ground floor terraces, steps and retaining walls we are investigating the use of a new technique to form terraces, steps up, and associated retaining walls from concrete recycled from the demolition of the existing house. This concrete could be cut and honed to form these new elements as mass 'dry' structures, thus retaining the embodied energy of the existing concrete on site without adding any additional concrete structure, all as described in detail within the structural engineers' report.

8.3 Water management

The existing site is currently made up predominantly of building and hard surfaces. Accordingly, the introduction of new planted areas and green roof areas will help to reduce the levels of surface water run-off; soft landscaping is maximised while the small amount of hard landscaping proposed is free-draining and permeable.

It is proposed that a Green Roof be used for the proposed development. Green roofs provide a rainwater buffer with attenuation for smaller storm events such as the annual or 1 in 2 year storm. They also have the added benefit of purifying the air, reducing ambient temperature, regulating the indoor temperature, saving energy and encouraging biodiversity. The green roof will cover an area of approximately 50m².

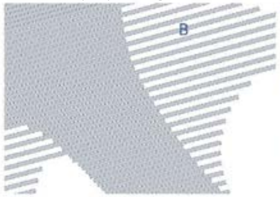
The planting of the garden has been designed so that an automated irrigation system will not be required and is drought tolerant. The Caithness stone paving will be permeable and therefore SuDS compliant.

Please refer to the flood risk assessment and SuDs strategy submitted with this application for further information.


existing hardscape


proposed green roof


proposed green roof




reclaimed landscape of more or less, paths made of Caithness stone offcuts laid vertically, steps and retaining walls potentially of concrete reclaimed from site