PLANNING CONDITION 10: ENERGY SAVING MEASURES

1.0 SUMMARY

The dwelling has been designed to be sustainable and efficient, using renewable energies whilst remaining viable to construct and comfortable to live in. It focuses on thermally efficient, fabric-first construction, and adopts a number of Passivhaus principles and energy saving measures. These include:

- Air source heat pump
- Mechanical ventilation with heat recovery
- Living green roof
- Bat boxes
- Electric car charging point
- Massive insulation
- Thermal balcony connectors
- High specification double (or triple) glazing
- Solar shading and controls
- Air tightness
- Low energy or LED lighting
- Provision for photovoltaic cells (future installation)

The detailed design has been developed in line with a full energy assessment and compliance report, developed though thermal modelling by an Energy Consultant.

Targets:

- Energy performance at level B as a minimum (level A with the addition of PVs)
- Low environmental impact and CO2 emissions
- Economic and low running costs
- Limited mechanical intervention
- Future proofed for PVs

2.0 CONSTRUCTION

Achieving demanding environmental standards requires a certain approach to building construction. This design has been developed with the Main Contractor and Structural Engineer to ensure the structure and 'fabric' of the building offer an opportunity to reduce its overall carbon use. Ground disturbance will be minimised, and the blockwork construction offers a quick and efficient construction process, offset by a palette of natural, durable and sustainably sourced cladding materials (timber and brick) to reduce industrial emissions and offer the biggest opportunity for long-term carbon storage. First floor construction includes insulation and the house incorporates thermal mass within the insulated envelope to moderate swings in temperature.

3.0 AIRTIGHT CONSTRUCTION

To achieve an energy efficient construction, great care has been taken to ensure a continuous insulating envelope around the entire building, as well as an airtight membrane, to minimise heat losses. All junctions have been developed to eliminate thermal bridges, and will be carefully monitored during construction. Thermal balcony connectors by Ancon (or similar) will be used to ensure the thermal line is not broken around the cantilevers (balcony and front overhang).

Given the high level of air tightness, MVHR is proposed to ensure good indoor air quality in the winter. The ducting layout considers installation cost, energy use and noise, and is being developed in line with the structural design to avoid any clashes prior to construction. An air tightness test will be carried out after the glazing has been fitted, but prior to first fix so any holes can be hidden and filled.

4.0 SOLAR GAINS

Solar gains are of critical importance to the design due to the Southern orientation. This provides the opportunity to optimise daylight and passive heating in winter, while controlling over-heating in summer. Over-heating due to the high levels of glazing facing the garden on the South elevation are controlled with the careful design of set backs, covered balconies, and overhangs. MVHR and a large evergreen tree to the South West also provide additional protection to overheating. The large corner window to the living room will be finished with a solar control layer to manage the risk within this space. High specification thermally broken double glazing (or triple glazing where appropriate) is specified throughout to meet the U-values required following the thermal modelling assessment.

5.0 ENERGY USAGE

The house is detailed in a fabric first approach, with a huge emphasis on minimising heat loss and reducing space heating costs, whilst also being economical and comfortable for a family of 6.

Specific U-values for each element and an air tightness target have also been defined and reflected in the detailed design.

Heating and Hot Water:

Whilst the building is not designed to meet the rigorous AECB Passivhaus Standards for energy efficiency, it is designed to be as economic as possible with minimal mechanical intervention. It balances a number of factors including heat emissions from appliances and occupants to maintain a comfortable indoor temperature throughout the year and the hot water demands for the whole family. Following a calculation of the building's energy consumption, a suitably sized ASHP will provide heating and hot water at a very low carbon emissions rate to multiple bathrooms simultaneously. This represents a sustainable and renewable source of energy.

Wet underfloor heating will be installed throughout the ground floor. This works best with heat pumps due to the low water temperature required. Floor finishes will be specified to ensure they do not impact it's performance.

Electricity:

The existing house is already connected to the grid, which will be needed to operate the MVHR and electric car charging point. However, the ASHP, low energy or LED lighting, and energy efficient appliances will help to minimise this usage.

The design also optimises the potential for considerable exposure from the South orientation to allow the potential for PV panels to be installed on the flat roof in the future. Based on an estimated 146m^2 of suitable roof space, this could generate approximately 4,500 kWh to 17,500 kWh annual output depending on the design and specification of the panels. With the addition of a 5 kWh battery, this could provide over 40% of the building's annual energy requirements, decreasing running costs and would be low carbon in operation.

6.0 LANDSCAPE AND BIODIVERSITY STRATEGY

The landscape is designed to ensure biodiversity across the site. Much of the existing hedging and mature trees will be retained, with a series of planted and hardscaped zones of varying character and scale connected by informal pathways to nestle the building into the landscape. A series of varied gardens will attract the sunlight at different times. A living green roof at first floor will include native varieties for pollinators.

A rich, biodiverse habitat is proposed with a variety of local planting, low level herbaceous borders, wild flowers and pollinating species, responding closely to the position on the site and orientation. The existing south facing lawn will be retained with some minor landscaping. Hard landscaping is kept to a minimum with sustainable natural decking products or recycled materials. A permeable access drive will allow for water runoff. The building uses much of the existing footprint, and a 'cut and fill' approach would be taken to earth removal and levelling, reducing the amount of soil leaving the site.

A bat survey and mitigation strategy has been carried out. The high parapets will enable new bat boxes to be integrated within the brick facade as indicated, as well as obscuring any potential visual impact of PV panels in the future.