



Sustainable Design Statement

In support of the planning application for:

New dwellinghouse at Westwater Building Group, West Linton, Scottish Borders

Planning applicant: Ian & Fiona Swann

VERSION 2

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MAKAR February 2023

SUSTAINABLE DESIGN & ACCESS STATEMENT

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1. Site appraisal

The site for this proposed dwelling is on a vacant site within the recognised building group at Westwater, West Linton.

The full site, under the ownership of the applicant has a total area of 1.32 hectares or 3.2 acres. The area of the proposed site curtilage to be developed is 0.46 hectares or 1.1 acres. The remainder of the land is to be landscaped to increase biodiversity, enhance landscape value and will be managed for productive products.

The proposal is for the development of a dwellinghouse in a single & 1.5 storey configuration with associated garage utilised as an ancillary building.

The site is bounded to the west by the public road and a band of mature, predominantly deciduous trees with significant landscape value. To the east the building group consists of three substantial dwellings and one small cottage. An adjacent dwelling, The Old Barn, to the east is single storey built on the footprint of a former agricultural building, with Westwater cottage to the south barely visible from the site due to tree screening. The other two dwellings making up the building group are one and a half storey main building element with single story wings.

To the north the site is bounded by the Westwater watercourse. Access to the building group is via a well-established shared lane defined by an avenue of trees.

The site curtilage is elongated on a north-south axis due to the presence of mature trees to the west. Access is off the shared lane from the south. The site opens out to the north with long hill views towards West Linton.

The site offers the opportunity to 'bookend' the building group with a dwelling responsive to the overall expression of the building group in the landscape.

2. Planning History

A Planning in Principle application was made by Mr Charles Bruce for the site early in 2021, reference 21/00285/PPP. This application was allocated to planner Randal Dods. The delegated Report of the 23rd April 2021 made a recommendation of refusal which was upheld.

The decision was appealed, reference 21/00010/RREF, to the Local Review Body (LRB) later the same year and the decision was reversed and signed off on the 19th November 2021. The principle of development on the site has been accepted on this basis.

A summary of the reasoning of the LRB is as follows:

It had been previously determined that a building group existed at Westwater. Members were satisfied that the site was a suitable addition to the group. *'Having looked at the boundaries of the group, Members were satisfied that the site fell within existing woodland to the west which encloses the group and that the development of a house on this site would help to 'bookend' existing residential development along the road side'.*

After consideration it was agreed that the building group had capacity to include this site within the current Local Development Plan. *The site was well-related to the group.... This development would complete the building group.*

Considering other material matters the LRB recognised that the mature trees were a key characteristic of the site and should be safeguarded with the future development.

After consideration, the scale of the dwellinghouse was not stipulated by the LRB.

Matters covering Landscape, access and site services were considered by the LRB but they felt that these could be covered by an appropriate Condition.

7 Conditions were allocated to the consent, all standard in nature.

3. Development Brief

The aspiration for the whole of the 3.2 acre site is the creation of an exemplar development both in terms of the site organisation and built infrastructure in addition to enhancing the landscape and biodiversity value of the site.

Careful thought and design development was undertaken during the Spring and Summer of 2022 resulting in the proposal and planning application in October 2022.



Location of the site relative to the existing building group.

Development criteria included:

1. Overall site organisation delivering built-environment, landscape and biodiversity enhancement.
2. Respectful and responsive to the building group adding a positive contribution.
3. Safeguarding the mature trees on the site while increasing tree establishment.
4. Best national practice in ecological, sustainable-construction delivery.
5. Passivhaus principles incorporated throughout the dwellinghouse.
6. Materials selection throughout with healthy, chemical free and non-toxic specification, anticipating re-use, re-cycling and re-manufacturing.
7. An overall Net-zero development acting as an example in the Scottish Borders region.

4. Site Organisation, Landscaping & Drainage

With the site organisation the proposed house and separate garage seeks to relate to the building group as a whole. While the single storey Old Barn property lies directly to the east, the two other properties making up the building group are rather larger both in overall height, and in footprint.

In their deliberations during the Planning in Principle appeal, the LRB clearly state that the proposed site is contained within the building group and that a future house development would 'bookend' the building group.

Therefore a house of similar configuration to Westwater the most easterly of the building group, effectively bookending to the east was considered. This property is a T form in plan, with a main 1.5 storey element, gables facing north and south, and a single storey wing to the west. The effective width of the site allowed a second single storey double garage wing to the east complete with PV array.

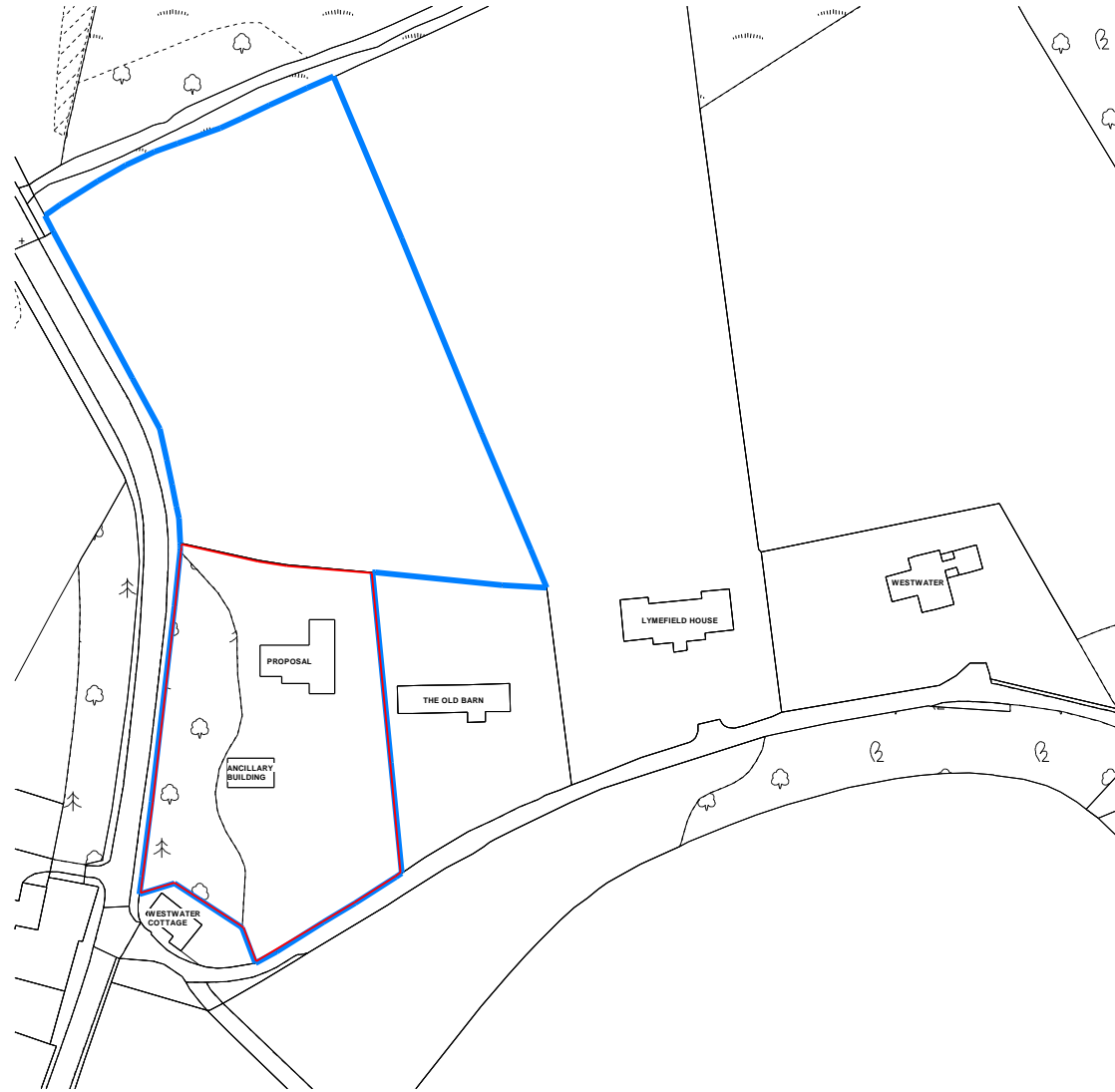


View of Westwater showing the main 1.5 storey house, garage wing, and western wing just visible.

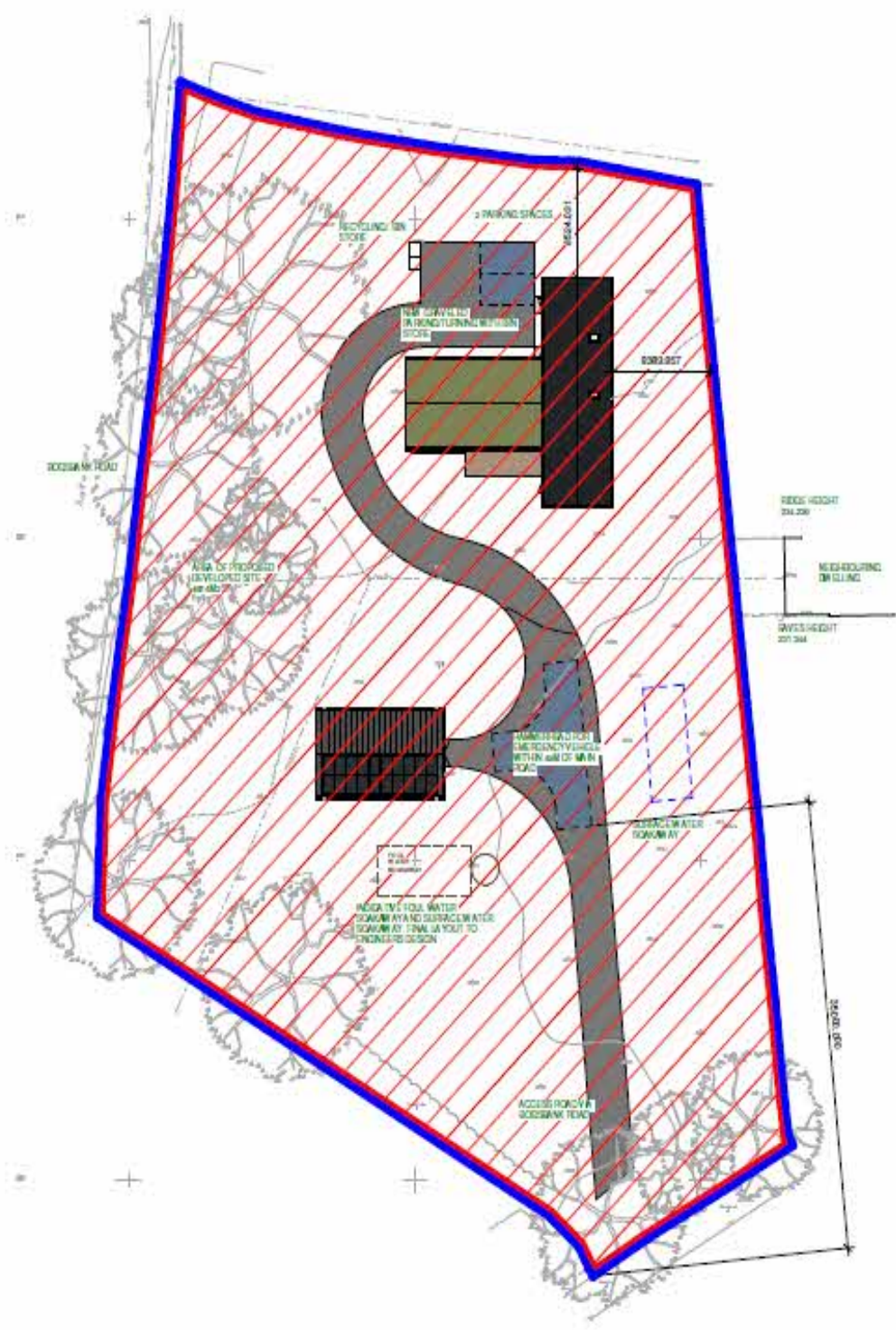
Due to the effective width of the proposed site, due in part to the mature trees to the west and proximity to boundary The Old Barn property to the east, which itself is close to its western boundary, the obvious approach was to utilise a T plan form similar to Westwater house.

The following diagram puts this suggestion in context. It clearly indicates the proposal reflecting the existing pattern of one and a half storey properties, both in footprint size,

orientation and form. The ancillary building is sited far enough to the south to form a defensive space between it and the house. Such an ancillary building is a prerequisite for a rural site, useful as it is for storage of equipment and tools etc. This structure also houses PV panels on its southern roof and at a pitch ideal for maximum performance at this latitude.



Westwater building group with proposed dwellinghouse & garage indicated – site outlined with red line.



Proposed site plan with access from the south, parking to the North and surrounding garden ground

5. Dwellinghouse Design

The development brief for a dwellinghouse with an accommodation schedule comprising:

- five bedrooms one with en-suite.

- Two bath / shower rooms.

- Utility and Drying room

- Generous open plan Kitchen, Dining and Living room.

- Required to be responsive to future accessibility with suitably sized bathrooms, circulation and door openings.

- Low to the ground for accessibility and integration with garden ground.

- External covered decked area to the south of the living area.

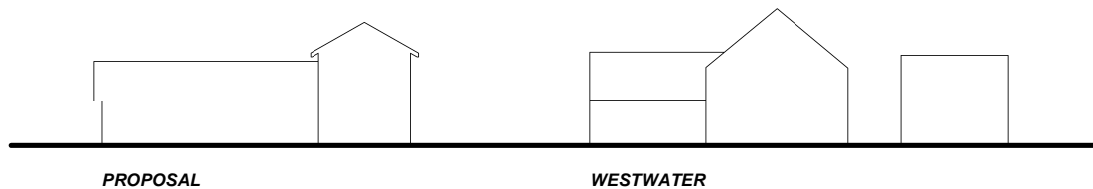
Ease of outdoor access to the south and west and away from the adjacent house to the east is a requirement. Providing privacy to both the proposal and adjacent dwelling.

The configuration of the dwelling is to be single room width providing maximum solar gain to all rooms with east light to bedrooms a particular feature.

Bedrooms with associated bathroom and utility services are located within the one and a half storey portion, while the living spaces are located within the single storey wing with east west orientation for full solar access. Windows are minimised to the north while providing views and orientation.

Building scale is to be suited to timber construction throughout without resorting to complex structural steel interventions. This requires structural spans to intermediate floors and roofs to be of a more historically traditional physical size; not more than five metres in width. The entire structure is timber throughout and all structural timber and external finishes are sourced from Scotland and where possible the Scottish Borders.

Ridge beams are utilised to support panelised roof sub-assemblies forming vaulted ceilings throughout providing a sense of space and relatively low ridge height. As the height of a pitched roof is a product of the width of the gable and angle of the roof pitch, the one and a half storey element is low in comparison to an average new built home as can be seen in the following diagram.



Comparative diagram indicating the relative width and height of adjacent Westwater to the Proposal.

The performance characteristics of the proposed dwelling require to be based on both Net-zero Carbon and Passive House principles. Thus the delivery of the overall development is required to be at least carbon neutral, off-set by sequestered carbon in the form of timber and other natural materials used to insulate the dwelling. Operationally, the dwelling is required to be ultra-low in energy usage and Energy-positive with site derived micro generation via an extensive PV array fitted to the garage building.

1. Accurate energy-use modelling using the Passive House Planning Package (PHPP)
2. Very high levels of Insulation
3. Extremely high performance windows & doors with insulated frames
4. Airtight building fabric avoiding heat-loss ventilation
5. Thermal bridge-free construction due to off-site manufacture
6. Mechanical ventilation with highly efficient heat recovery

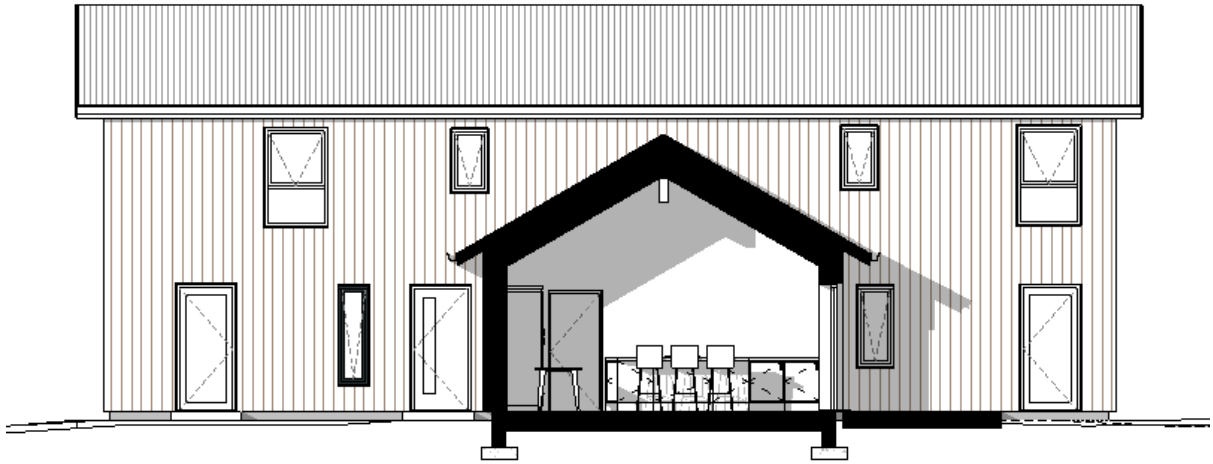
Roof overhangs are incorporated to both visually articulate the roofs themselves and to offer protection to the timber clad external finishes. It is proposed that the higher roof is finished with a high quality sinusoidal steel profile sheeting, a commonly used roof finish in rural Scotland. The lower roof will have a living Sedum finish. This is a contemporary solution offering a number of benefits including water and snow retention, positive ecological and biodiversity advantage rather than an inert and energy intensive imported concrete or slate finish. In the Spring, Summer and Autumn the flowering Sedum will provide habitat for pollinators, and in the winter it will contribute in part to the overall thermal performance unlike more conventional and carbon inefficient roofing materials. Both roof types while long lasting, can be maintained, replaced and recycled with ease.



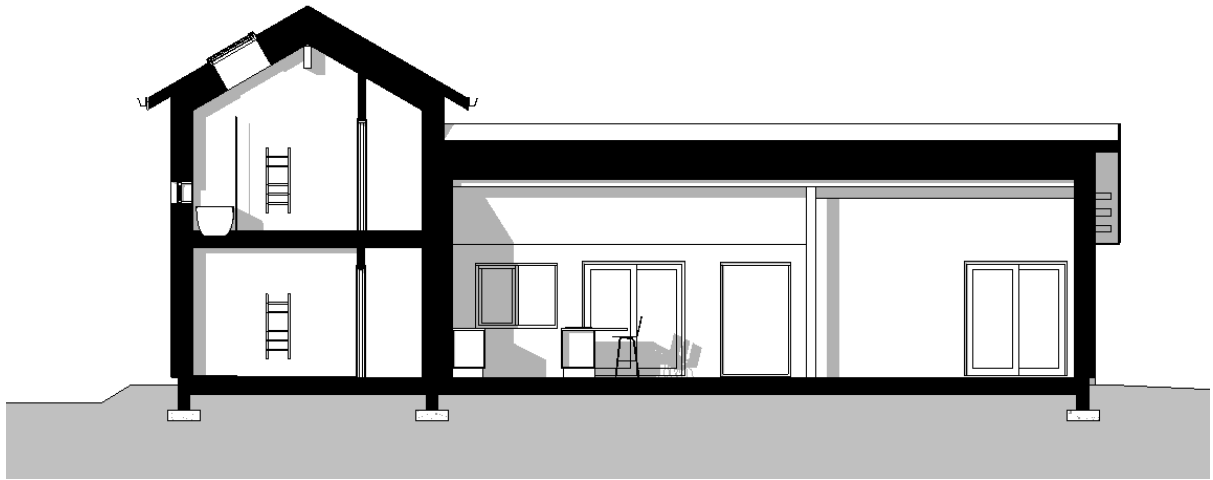
View of proposed house from Southwest



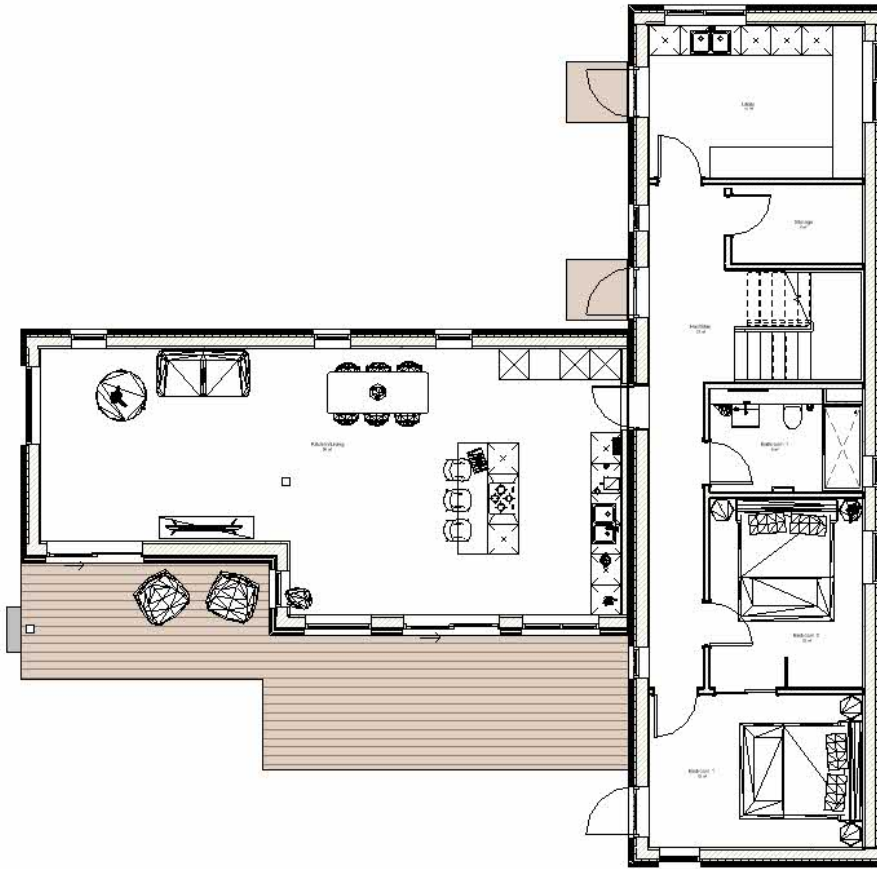
View of proposed house & garage from East of driveway



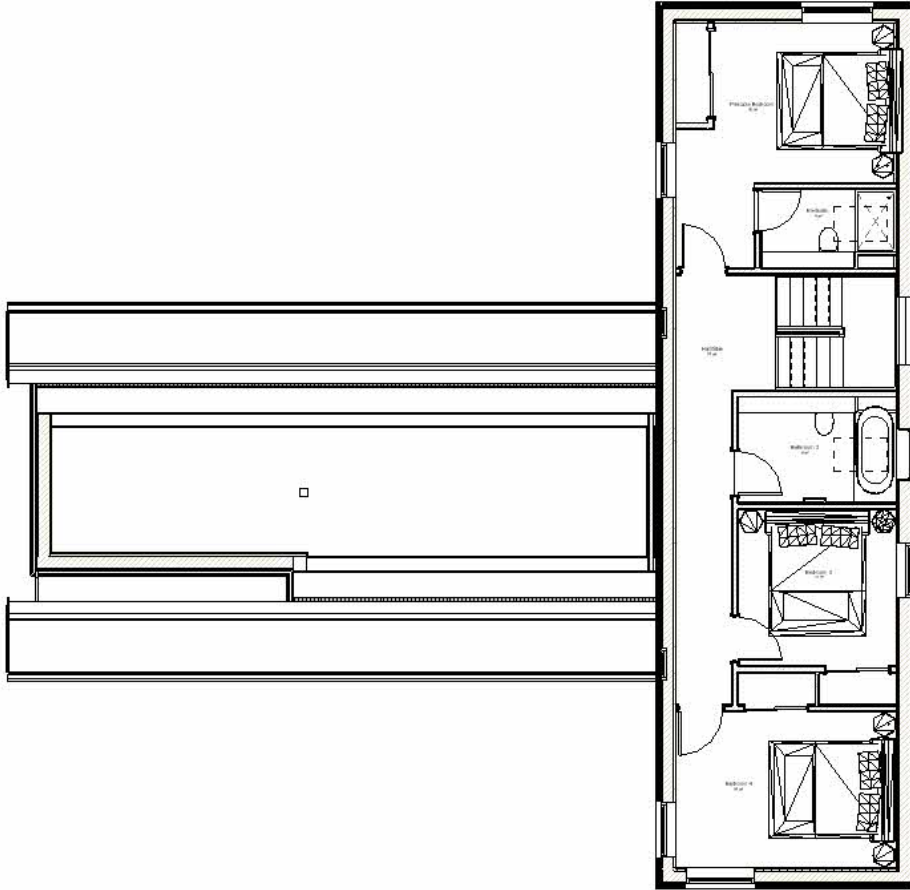
Section through kitchen/living area (not to scale)



Section through both parts of the house (not to scale)



Ground floor plan (not to scale)



First floor plan (not to scale)

As can be seen from the floor plans, the house is essentially divided into 2 distinct sections, the first being the kitchen/living area and second being the bathrooms, bedrooms, storage and service spaces.

6. Construction Materials, Energy, Heating and Services Strategy

The proposed dwelling will be Net-zero carbon on delivery with the careful choice of materials, construction and delivery methods.

MAKAR makes use of innovative off-site Modern Methods of Construction (MMC) which have been proved to significantly reduce embodied energy during the delivery of house projects.

The proposed dwelling will be constructed off-site and assembled by MAKAR Ltd. The house will make use of a limited palette of locally available, natural, and locally appropriate materials. Metal profile roofing is an efficient, readily available material with many references locally in agricultural buildings.

The timber frame and Larch cladding will be locally or Scottish-grown and are environmentally sustainable choices. The Larch, which is naturally durable will be untreated, and will be detailed carefully so that chemical treatment can be avoided. It will also be left to weather naturally over time and the gradual silvering of the wood will further help integrate the house with its wooded context. Likewise, areas of post and beam supporting overhanging roofs will be constructed of Larch or Douglas fir, which will weather in a similar manner. External doors and windows will be factory-painted timber frame in a complementary colour.

Other components will be manufactured of highly durable, low maintenance materials, for example, sinusoidal profile dark grey metal roofing, and Lindab, galvanised steel for gutters and downpipes.

This palette of materials, and the contemporary construction method is offered as a sustainable and considered response to the challenges we are facing with the Climate Emergency.

The house is designed to sit on a ground supported concrete slab. This allows for the 'bedding down' of the house into the landscape – makes transitions from the house into the garden more fluid (without numerous steps), and the mass of the concrete provides a valuable thermal store for passive and internal incidental thermal gains.

Carbon is locked up in the Scottish-grown timber. The benefits of this approach to design and construction include:

Durability over an extended period for low maintenance and long life;

Cost, affordability, and functionality. Local materials are used as far as possible to reduce embodied energy and to the advantage of the local economy;

Aesthetics – the natural colours and texture harmonise with the rural landscape.

Energy and Heating Strategy:

Carefully placed triple glazed windows will enable passive solar gains to be captured within the dwellinghouse.

A mechanical heat recovery ventilation system (MVHR) will be installed. This is a requirement of the Building Regulations with a dwellinghouse of an exceptionally airtight nature. The MVHR maintains both air quality and regulates moisture levels within each room.

The proposed dwellinghouse will take advantage of the increasingly decarbonised electricity grid. In addition to the grid, electricity generated by Photo-Voltaic (PV) panels, installed on the south-facing garage roof, will feed a Tesla battery allowing on-site storage of power. Surplus

generation will be utilised to heat a hot water storage tank. Space heating will be by way of energy efficient infrared panels. Domestic hot water requirement will be provided year round by a combination of thermal solar panels and the surplus from the PV array as mentioned above.

Back-up secondary space heating will be provided by a direct air-intake, efficient wood burning stove.

Services:

Connection to mains electricity, fibre optic cable, and the public water supply are anticipated.

Low water use:

The following will be utilised to reduce the use of water in the house:

Low dual flush low water WC's.

Flow reduced/aerating taps fitted throughout.

Showers rated at no more than 6 litres / minute.

Low water uses white goods; dishwasher and washing machines.

Access, parking & turning:

A vehicle turning area will be provided as indicated on the proposed site plan, within the application site, and will be formed in accordance with The Scottish Border Council's Road Guidelines for New Developments. 3 car parking spaces will be provided within the curtilage of the dwellinghouse.

7. Modern Methods of Off-site Construction

The house will be constructed from 280mm natural-Structural Insulated Panels (n-SIP), within which breathable cellulose insulation is installed. An external layer of 40mm 'Steico' wood fibre insulation is wrapped around the outside of the panels, to reduce thermal bridging through the timber frame. This highly insulated envelope will be sealed at all joints and corners resulting in an overall air tightness below $1 \text{ m}^3/\text{h.m}^2 @ 50 \text{ Pa}$. The MVHR system will ensure adequate ventilation and air quality internally, while avoiding heat loss through the necessary introduction of fresh air.

The large structural components of wall and roof panels will be prefabricated off-site, incorporating cladding, doors, windows, and roof covering. These components will be delivered by road and erected by a small team on site.

This method allows greater certainty over timescale and quality, and reduces site works, which can be significantly affected by the Scottish climate. There are also benefits to the existing neighbours, due to the reduced site time needed to erect the house ready for internal trades, and to the environment due to the fewer journeys required from workshop to site.



MAKAR Workshop, Inverness (above), and typical off-site constructed wall panel being craned into place on site (below)



Waste reduction:

In Scotland today construction activities utilise 50% of all material commodities and produce 50% of all waste. This inherently wasteful approach cannot continue in a country transitioning to a Circular Economy by way of Just Transition.

MAKAR employs *Lean* Construction principles and methods thereby fundamentally reducing waste in the following ways:

Reduction of transport of components and personnel by concentrating the manufacture in a factory environment.

Design for Manufacture and Assembly, and not Manufacture for Design. The design process responds to standard timber and timber rich sheet material dimensions, thereby avoiding cutting and wasteful practices during the manufacture process.

All existing materials; soil, sub soil and aggregates will be retained on site for re-use.