

BRIEF

Brief & Sustainability Strategy

The brief for the building was to create a highly sustainable family home that responds to the topography, microclimate, ecology and tones, colours and textures of the surrounding landscape. The designs were to recognise the importance of supporting local and national targets towards net-zero construction and building operations and the need to utilise a range of passive environmental principles alongside extensive use of renewable technology. The sustainability strategy for the project follows the principles set out by the 8 RIBA Sustainable Outcomes.

The brief for the house was to create an attractive, modern and innovative building that draws on and respects the material palette and massing of the local built context whilst creating light, energy efficient, contemporary spaces with close connection to its surroundings. Flexibility was to form a key aspect of the brief; creating a five bedroom dwelling that addresses the accommodation needs of the family now and in the future. This includes provision for those with accessibility needs as well as the flexibility and adaptability to allow for working from home.

Environmental zoning of the house was important, with provision of a layout that provides the opportunity to open up or close down use of the house as required in order to reduce operational carbon use. Particular regard was to be given to passive solar gain, solar shading, passive cooling and thermal storage. Passive house design detailing was to be incorporated wherever possible.

The existing low-quality construction bungalow characterised by a low pitch roof, low levels of insulation, horizontal windows and materials with little connection to the Borders. It is to be replaced with an exemplar low-carbon, durable building that sits discretely in amongst the existing tree planting. Departure from the existing building style was to be based on the desire for a more positive contribution to the landscape and more sustainable and energy efficient design.

Siting of the house was to respect and preserve established woodland to the north, west and south as well as creating improved grassland habitats in the wider site area and contributing positively to site biodiversity through use of living roofs. Avoidance of intrusive cut and fill was important, with an ambition for ground floor planes to tie in with natural site topography. Form and elevation treatments were to be developed with respect to the visual impact on both immediate and wider context, with particular attention paid to key visual receptors across the valley.

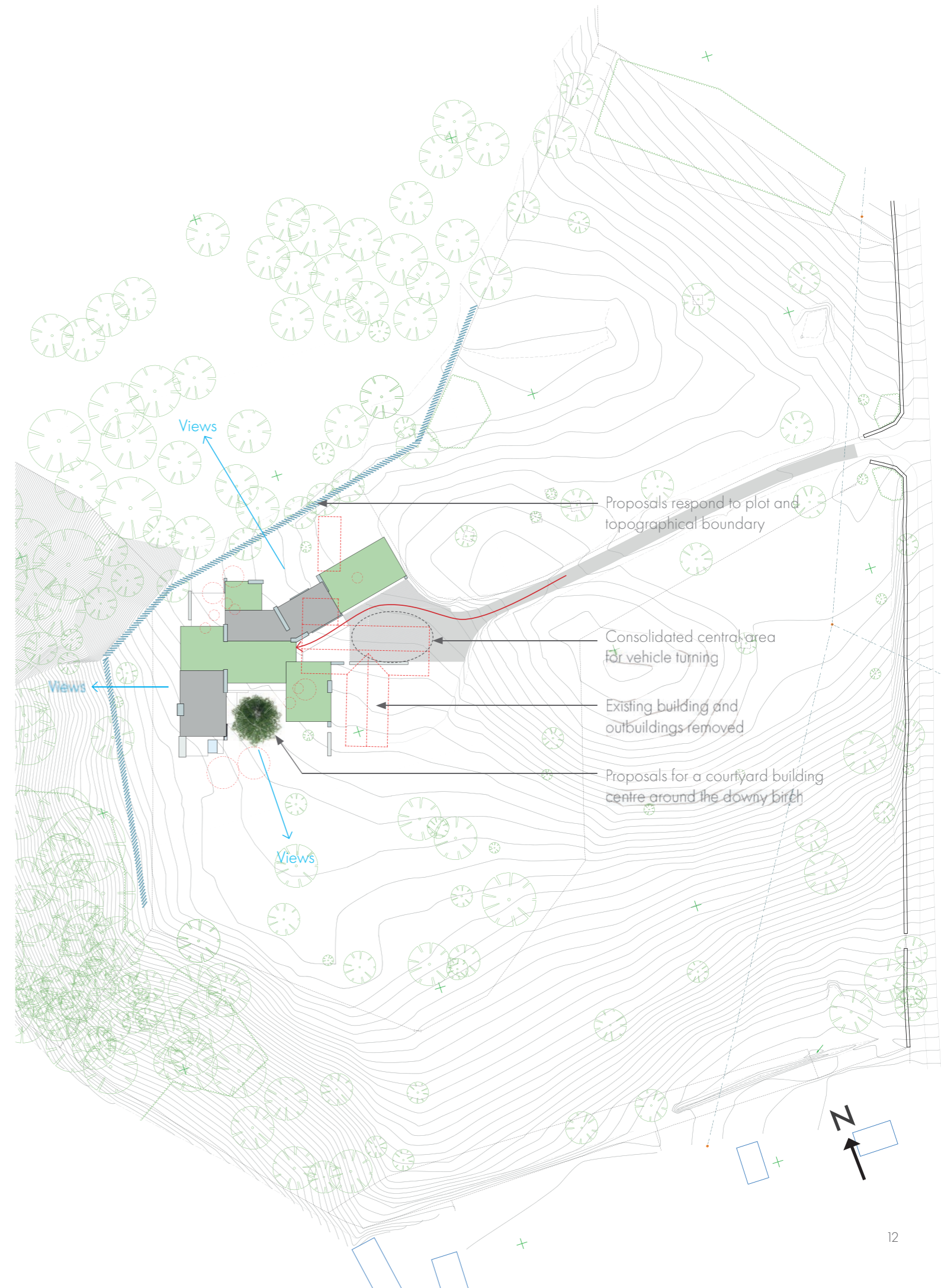
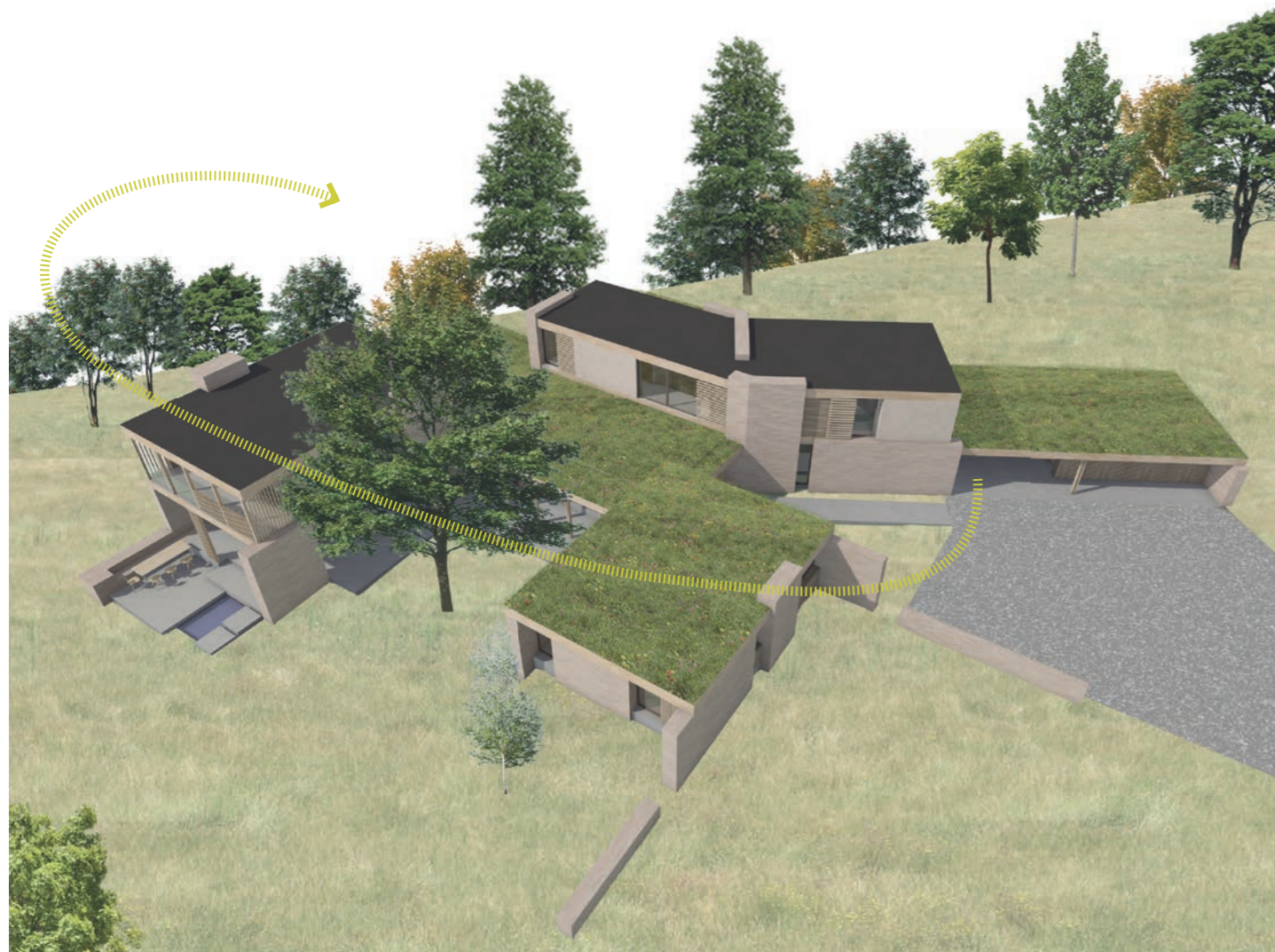


Precedents

DESIGN PROPOSALS

Siting

The site is characterised by existing woodland and grassland habitats that represent a valuable resource for both local biodiversity and health and wellbeing. The positioning of the house aims to maintain these habitats and create a strong sense of connection between the house and its surrounding topography and ecology. The house is positioned close to the existing building footprint but pushed slightly further back to reduce the visual impact from the road. This nestles the building better into existing tree screening to the north and west and allows for two storeys without significantly increasing the height of the building relative to the existing by following the natural slope of the site.

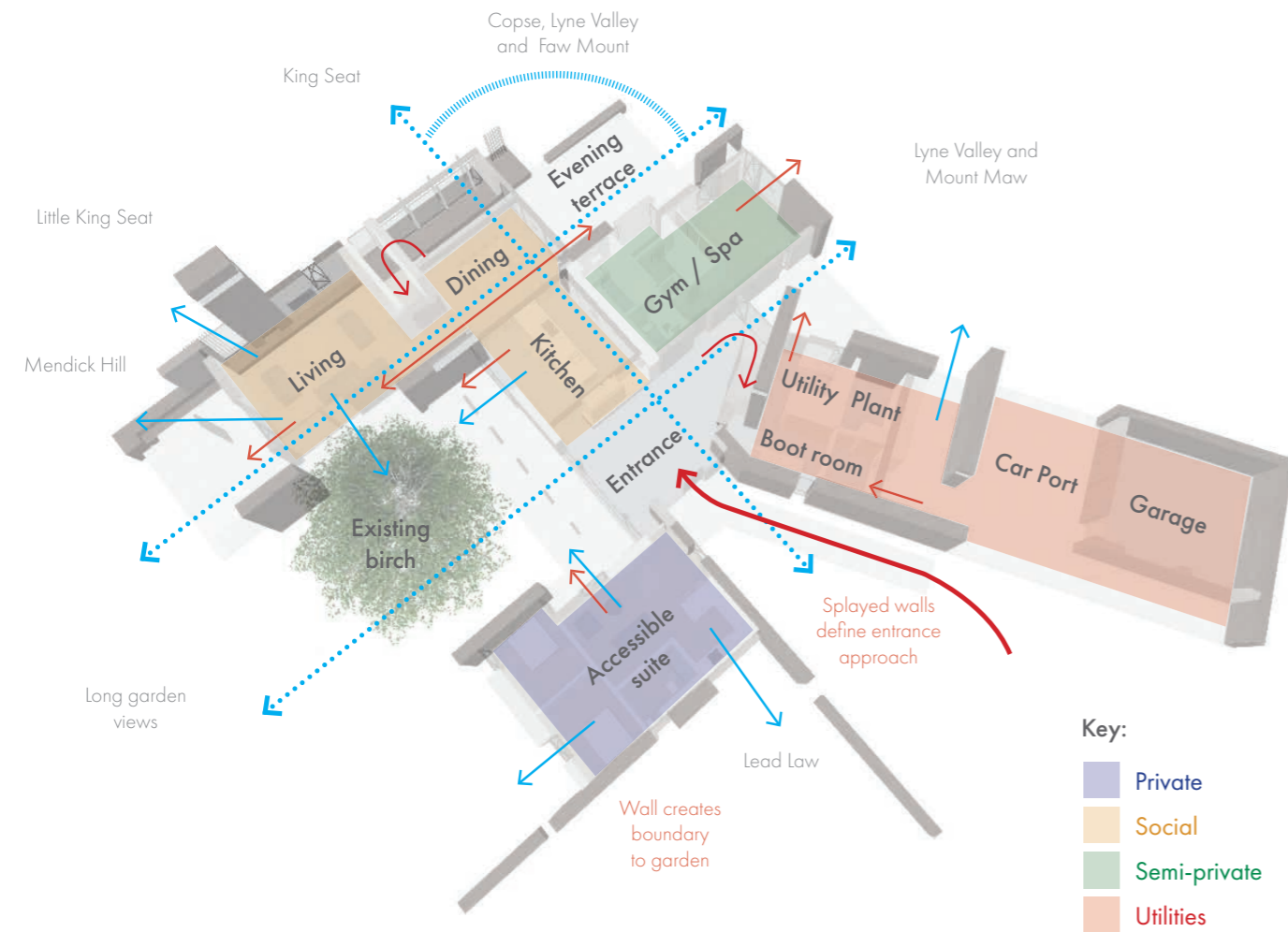


DESIGN PROPOSALS

Building layout and orientation

The house is split into three principle wings, which each address key views out across the site and enable the house zones to be opened up or closed down according to the family's needs. Achieving low-operational carbon was a key component of the building brief in accordance with **PMD1 Sustainability** noting the need for "e) the efficient use of energy and resources, particularly non-renewable resources.". The building division into easily controlled zones allows for energy use to be targeted as required depending on levels of occupation and seasonal variations.

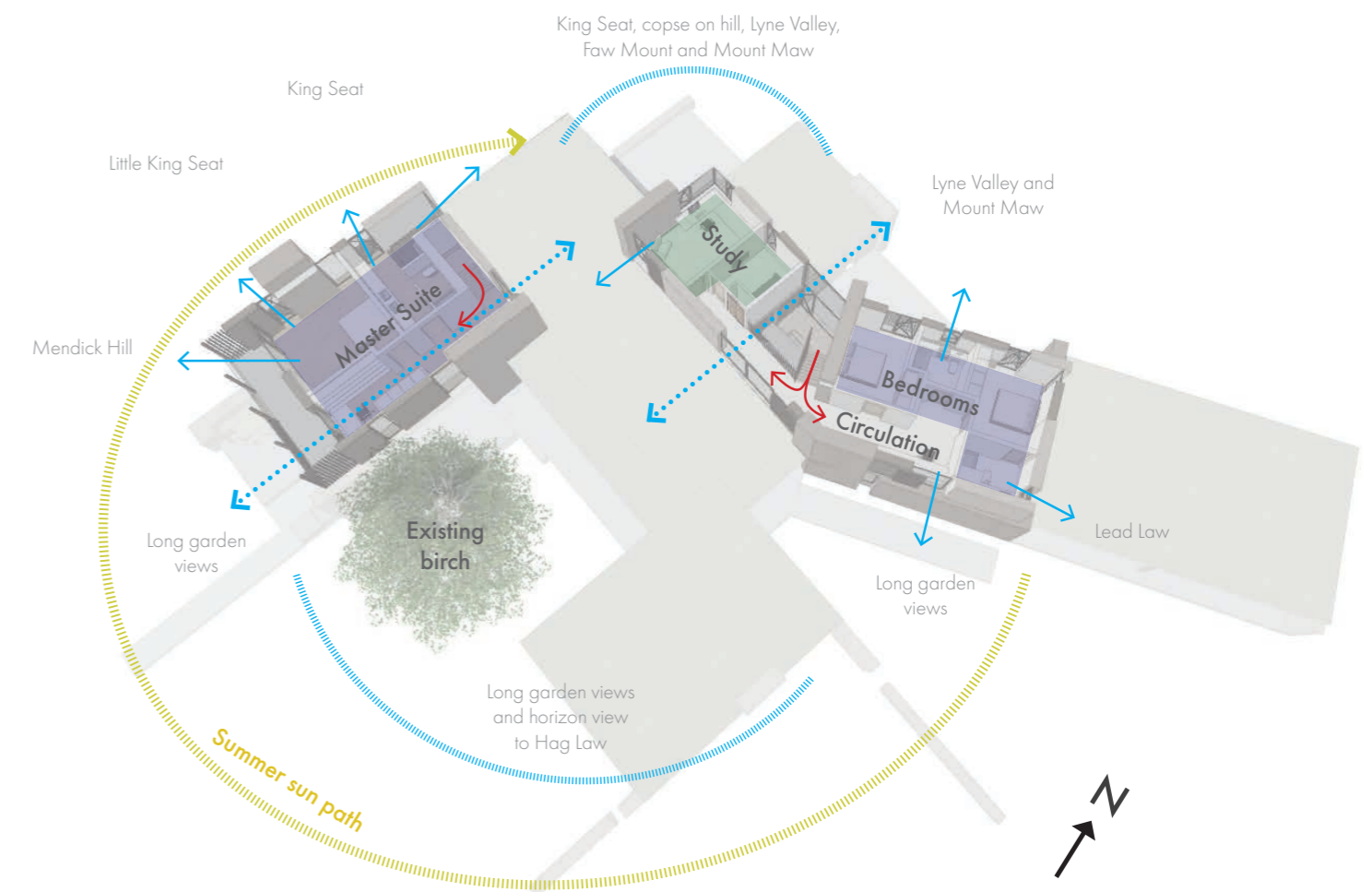
The key living spaces of the house are oriented to the south, maximising passive solar gain as well as aligning with key views. By splitting the building into wings with generous amounts of glazing separating them, natural daylighting is optimised throughout the day. The layout and orientation also responds to the need to provide passive ventilation through the house and the opportunity to connect to sheltered outside spaces at different times of day, depending on wind direction.



Ground Floor Layout Diagram

Living spaces address the outlook to the south and west whilst the more enclosed garage and less frequently occupied accessible guest rooms provide a privacy buffer between these living spaces and the road. The kitchen benefits from south light spilling through from the south-facing courtyard as well as capitalising on morning sun through the east-facing entrance area and evening sunlight from the west-facing glazing to dining area.

Less frequently used spaces such as the gym, utility room and upstairs bedrooms are positioned to the north where lower passive solar gain will have less impact. The upstairs north study benefits from even north light and lack of glare.



First Floor Layout Diagram

DESIGN PROPOSALS

Building Massing and Form

The form of the building is contemporary, employing high-quality detailing and materials to create a highly sustainable, energy efficient family home that takes inspiration from the materiality, scale and mass of local buildings and the topography, tone and colour of the landscape they sit in. Designs have been developed in alignment with **PMD2 Quality Standards: Placemaking and Design** which notes that a development should demonstrate that; *“h) it creates developments with a sense of place, based on a clear understanding of the context, designed in sympathy with Scottish Borders architectural styles; this need not exclude appropriate contemporary and/or innovative design”*

The proposed split of the house accommodation into wings creates three principle masses which respond to the scale of buildings typical in the surrounding landscape in accordance with policy **PMD2 Quality Standards: Placemaking and Design** requirement for proposals to show that *“i) it is of a scale, massing, height and density appropriate to its surroundings and, where an extension or alteration, appropriate to the existing building”*. By breaking the building into these smaller constituent parts, the range of accommodation outlined in the brief is achieved without creating an overly bulky building.



DESIGN PROPOSALS

Composition

The form of the building responds to the topography and landscape, with floor levels following the natural topography to step down the hillside in line with the slope of the ground. The ground floor now incorporates an accessible entrance and accommodation in accordance with **PMD2 Quality Standards: Accessibility** noting the requirement for a development to demonstrate that “(p) it incorporates, where required, access for those with mobility difficulties.”

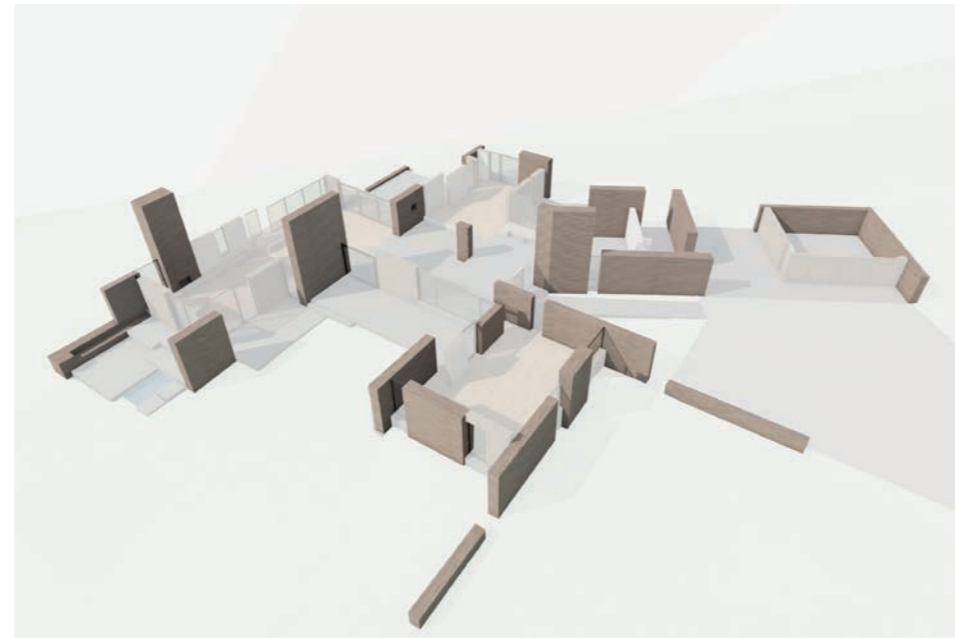
Each wing is separated by areas of glazing, not only maximising solar gain and natural daylighting but also creating a more permeable form that blends into its woodland setting. The form of the building reaches out horizontally to its surrounding landscape, connecting the building strongly with its context.

First floor accommodation is limited to two smaller zones interlinked with flat green roofs over ground floor spaces. By limiting the first floor footprint and separating these taller forms, the mass and therefore visual impact from key points in the valley is minimised. The first floor accommodation is kept close to the height of the existing house ridgeline. The first floor elements sit over the western portion of the building, set further back from the road, thereby further reducing the visual impact and perceived mass of the building from the surrounding area relative to the existing house.

Key areas of sandstone construction reflect the tone and solidity of local buildings and anchor the house into the site. Other wall treatments are set back from these sandstone elements, giving the sandstone prominence and ensuring that glare from window reflections are avoided. Flat living roofs span between the taller sandstone element, tying the building into its landscape setting and providing support for increased biodiversity on the site.



Building steps with the natural contours of the existing site, minimising cut and fill.



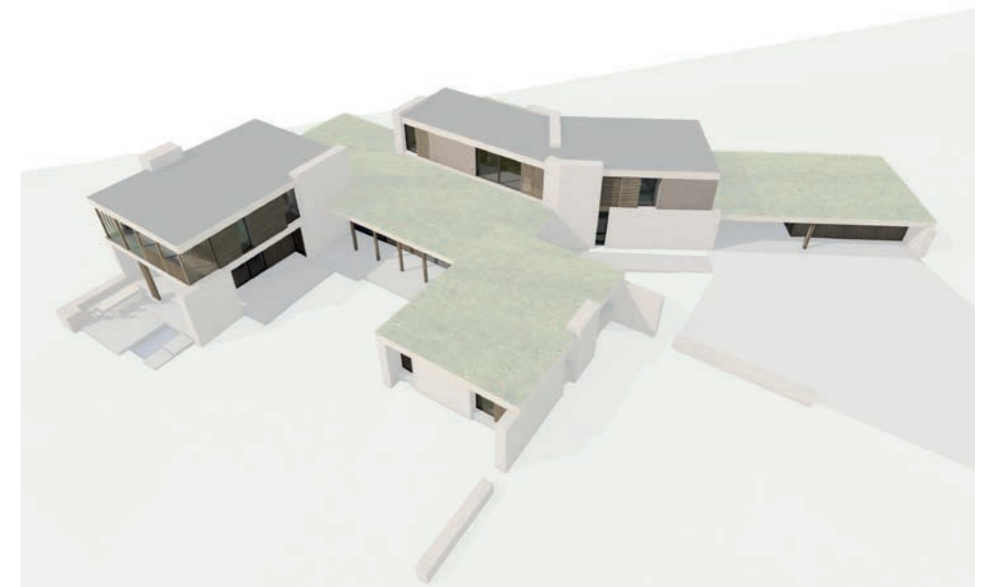
1 - The primary stone wall components of the building have the most visual weight and strength to ensure they feel 'grounded', a quality typical of Scottish vernacular architecture. Their careful placement defines the primary axis of the building. The gaps through the thick walls create framed views and deep thresholds, adding to a sense of protection, privacy and introspection.



2 - The floor plates step down with the natural contours of the land to provide level terraces into the garden. Doors and large format glazing provide access and help to draw the landscape into the building with the timber panel infill elements positioned to frame long views into the landscape but also long views through the building itself.



3 - The roofs edged in a reconstituted stone have a masonry plate character and so feel appropriate that they sit on top of the masonry walls or in some key areas, embed into them. In areas where these roof plates visually span large distances, timber posts placed at regular centres to create a collonade in the courtyard and bedroom terrace.



4 - Infill panels of timber and some of ashlar sandstone on the first floor help to break up the visual weight to soften elevations. The timber cladding and timber screens in particular have a sense of movement between the roof plates.

DESIGN PROPOSALS

Materials

The materials proposed have been chosen both for their connection to local building materiality and landscape tone, texture and colour, and for their sustainability credentials. Materials have been chosen in accordance with **PMD2 Quality Standards: Placemaking and Design** requirements for a proposal to demonstrate that “it is finished externally in materials, the colours and textures of which complement the highest quality of architecture in the locality and, where an extension or alteration, the existing building.” Warmer tones have been favoured in order to avoid the building standing out too much when viewed from further afield.

Two tones of sandstone proposed are applied in accordance with a form-led hierarchy. Primary elements with the greatest sense of mass and solidity employ a warm, pink sandstone in larger block sizes. Secondary masonry walls are set back from the pink sandstone areas and use a lighter grey/buff colour in smaller block sizes.

The proposed sandstone walling is to be selected to match local use of sandstone in the Borders. Use of material sourced from within the Scottish Borders and use of stone rather than clay fired brick will keep embodied carbon to a minimum. Additionally the sandstone will offer high thermal mass, assisting in the passive heating and cooling of the building.

Areas of walling expressed as lighter, infill elements are to be clad in timber cladding. Timber is to be sourced as locally as possible from Scottish timber supplies to minimise embodied carbon from transportation to site. Timber cladding will weather to reflect the tones of the woodland on site.

Roofs to the ground floor are to use living roofs sown with a wildflower and herb mix reflective of the mix of species found on site and in the surrounding area. Roofs to the first floor are to be finished in single ply membrane.

External hard landscaping is to use stone paving sourced locally. The existing tarmac access track is to be retained with areas closer to the existing house either renewed into garden areas or extended to form the requisite turning areas for treatment tank de-sludging vehicles and fire service vehicles.



1 - Sandstone: dressed face, pinker hues, larger format



2 - Sandstone: ashlar faces, warmer tones, smaller format



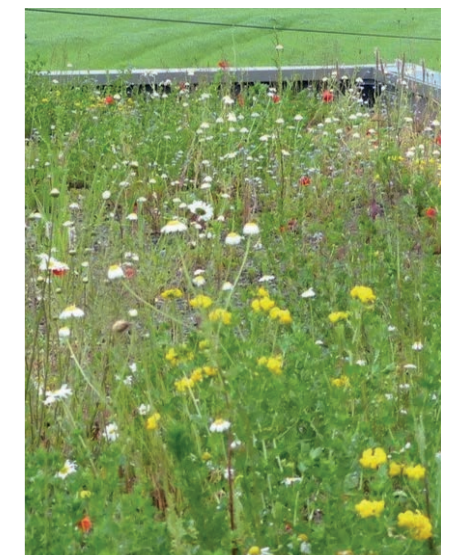
3 - Timber cladding



4 - Timber screening



5 - Reconstituted stone



6 - Wildflower roof

SUSTAINABILITY

The proposed house has been designed with consideration for the 8 RIBA Sustainable Outcomes, namely:

- Net zero operational carbon
- Net zero embodied carbon
- Sustainable water cycle
- Sustainable connectivity and transport
- Sustainable land use and bio-diversity
- Good health and wellbeing
- Sustainable communities and social value
- Sustainable life cycle cost

The new house replaces the existing poor quality bungalow as this provides an opportunity to significantly improve energy efficiency and integration with the surrounding landscape. In this the replacement dwelling is in accordance with **HD2 Housing in the Countryside: Replacement Dwellings** requirement for replacement dwellings to “provide environmental benefits such as a positive contribution to the landscape and /or a more sustainable and energy efficient design.”

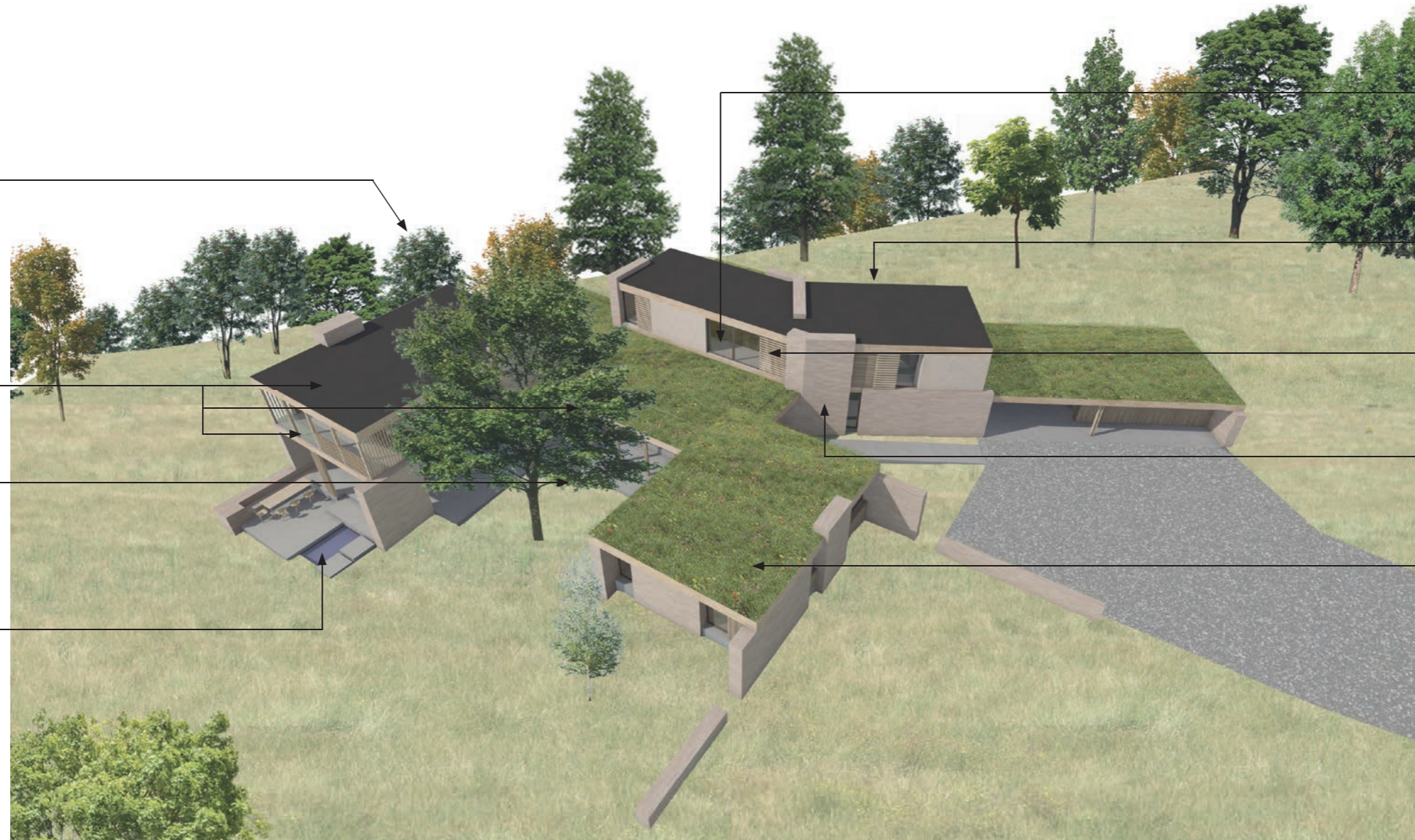
The form and orientation of the building and use of materials with high thermal mass have been designed to assist in passive heating and cooling of the building in accordance with **PMD2 Quality Standards: Sustainability** which notes the need to demonstrate that “that appropriate measures have been taken to maximise the efficient use of energy and resources, including use of renewable energy and resources”.

Glazing predominantly on the south and west elevations to maximise solar gain areas that are more often used i.e. kitchen, living, dining, evening terrace

Overhanging south roof projections provide solar protection against high summer sun but permit low winter sun in

Courtyard design and large areas of glazing helps to pull light further into the house reducing the need for artificial lighting

Surface water is collected from courtyard roofs to be re-used for water features eventually draining through a SUDs soakaway



Windows at high and low level in the main entrance hall permit passive ventilation. Various other windows and doors align through the building to also allow for passive ventilation.

The utility zone contains Mechanical Ventilation Heat Recovery (MVHR) and Air Source Heat Pump systems to maintain comfortable air temperature

Louvres and sliding timber screens help to mitigate solar gain on high temperature summer days.

Stone provides thermal mass for storing solar thermal heat. Stone and timber are also low in embodied energy.

Wildflower roofs provide habitats for further biodiversity, offer people interest looking out of first floor rooms, and softens the building's harder stone edges

Solar PVs array located north of the site to create renewable energy for the building

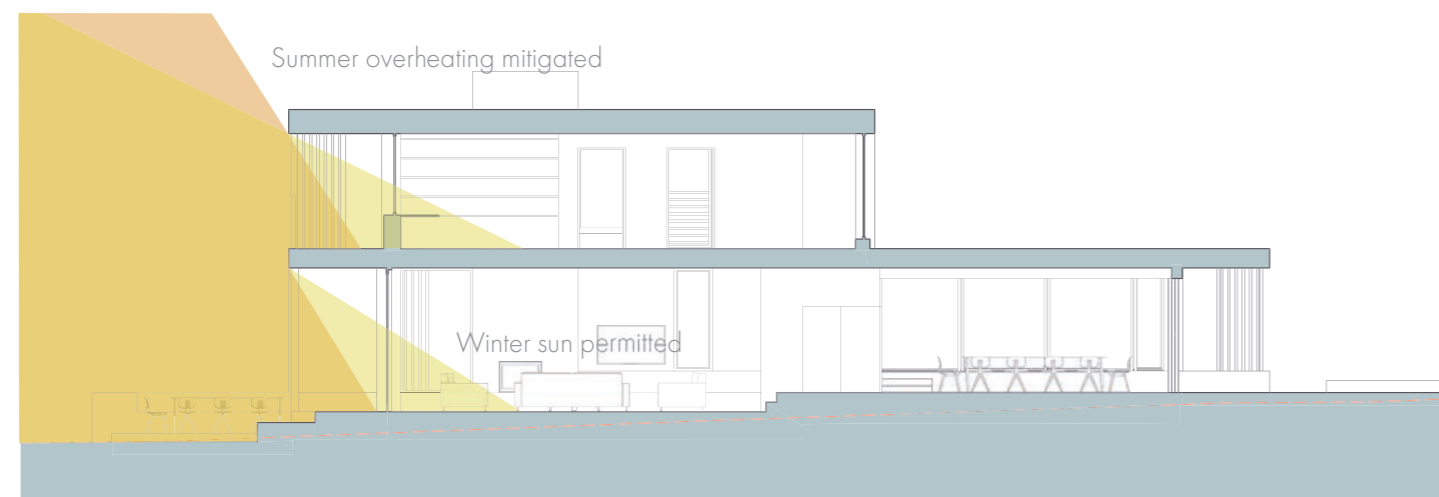
SUSTAINABILITY

A fabric-first approach is proposed for the construction of the building envelope, providing excellent insulation levels and air tightness alongside passive-house-standard detailing. These measures will sit alongside use of renewable energy sources for heating and power to achieve a net-zero operational carbon building. Renewables proposed include air-source heating, mechanical ventilation with heat recovery, and solar PV providing renewable power.

Low flow fittings will be utilised throughout the dwelling to minimise potable water use in accordance with **PMD2 Quality Standards: Sustainability** noting that a development should demonstrate that “*d) it encourages minimal water usage for new developments.*” Rainwater harvesting is to be utilised in connection to surface water drainage, collecting water for garden use. Drainage is to be appropriately treated to ensure that adjacent water courses including the nearby River Tweed Special Area of Conservation are unaffected.

As mentioned previously, materials such as natural stone and timber cladding will be sourced locally to reduce embodied energy. High embodied energy elements such as steel and pressed aluminium are to be kept to a minimum.

Designs have been developed around care and enhancement of the woodland and grassland habitats on site with minimal numbers of trees affected by the proposals. The small number of trees proposed for removal are of medium or low quality and will be replaced through tree planting elsewhere on the site. The trees affected either fall within the footprint of the proposed building or in the case of one tree are proposed for removal to increase passive solar gain to the house. The proposed living roofs will help support pollinator species and provide attenuation to surface water drainage. No species noted in the attached ecology report will be affected by the proposals.



Section illustrating passive designs for winter solar gain and summer overheating mitigation



Looking up at the west elevation from down the slope

BUILDING FORM

Proposal from the South

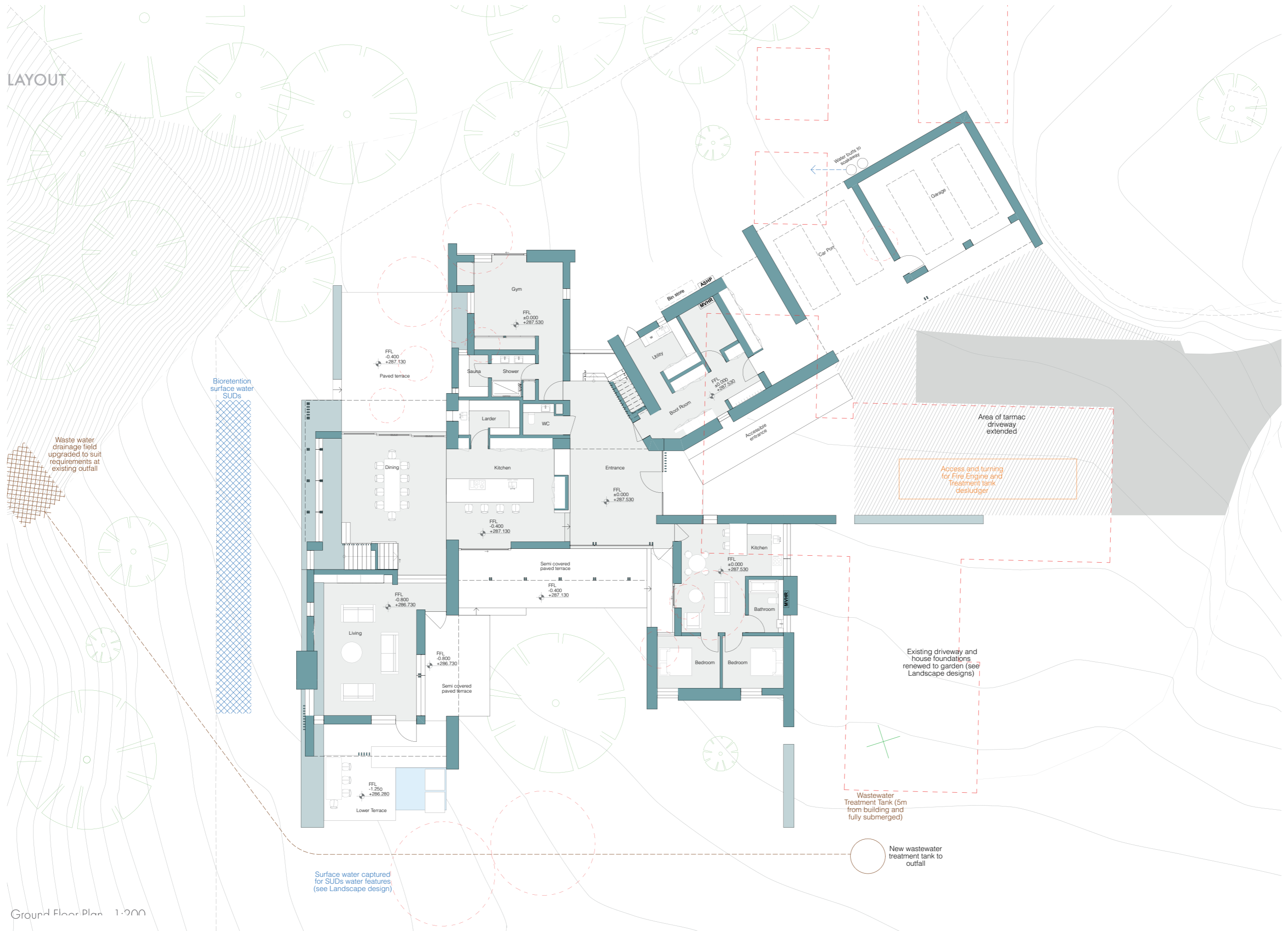


BUILDING FORM

Proposals from the North West



LAYOUT

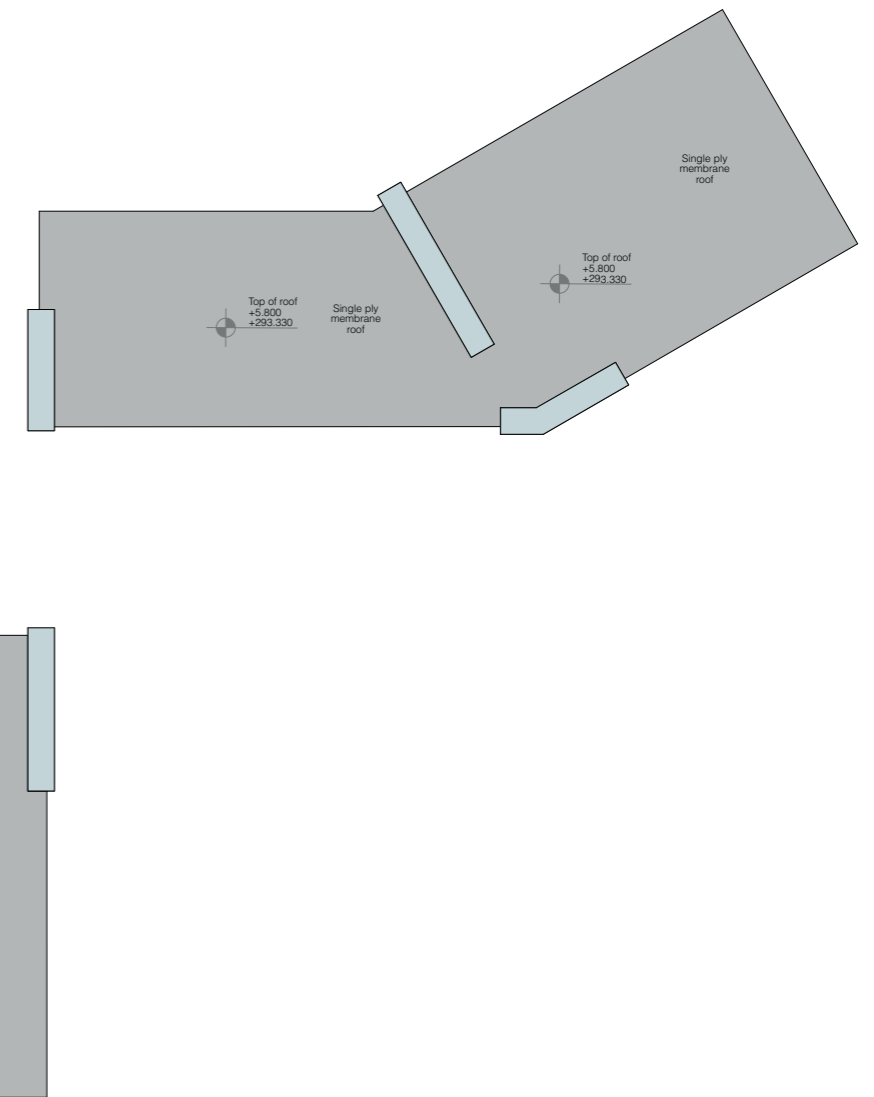


Ground Floor Plan 1:200

LAYOUT



First Floor Plan - 1:200



Roof Plan - 1:200