

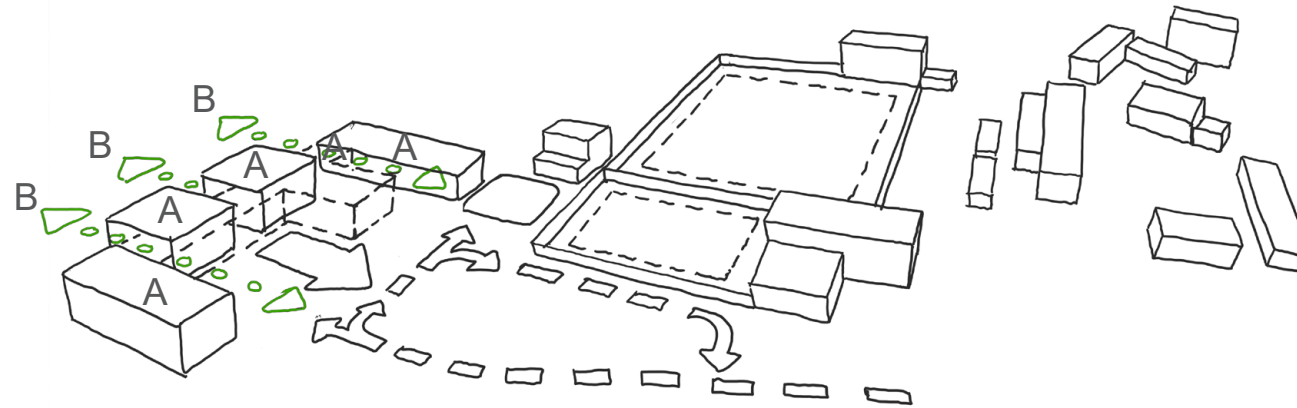
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AMENDED MASSING 2

The massing is amended to reduce the overall scale and respond to the grain of the existing estate

A The massing is broken down into four principal forms.

B The resulting gaps are considered 'green corridors'



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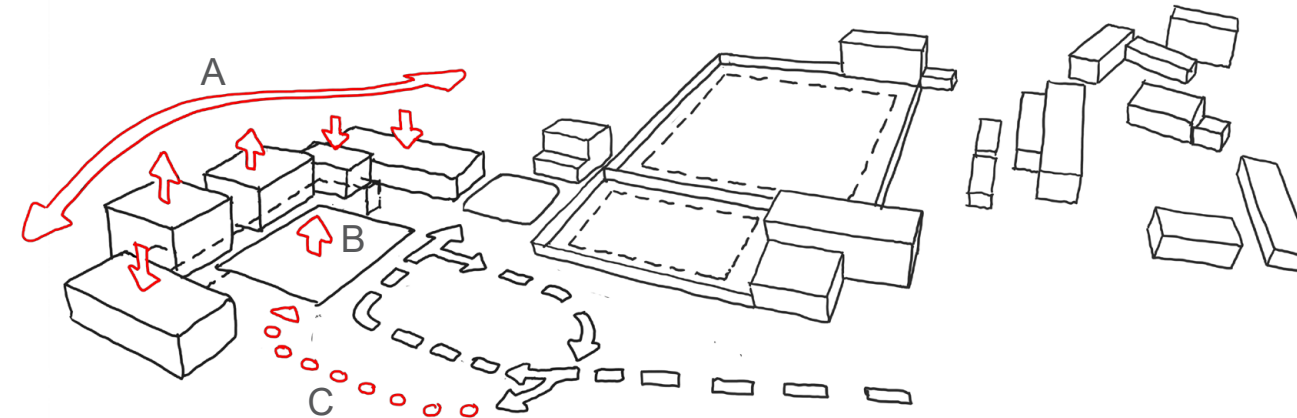
AMENDED MASSING 3

The height of the proposed massing is resolved

A The height of each wing is manipulated to respond to both the internal use and what is considered the natural high point on the site

B The podium is lifted to create a landscape pedestrian approach and undercroft parking

C A dedicated entrance to the undercroft is created



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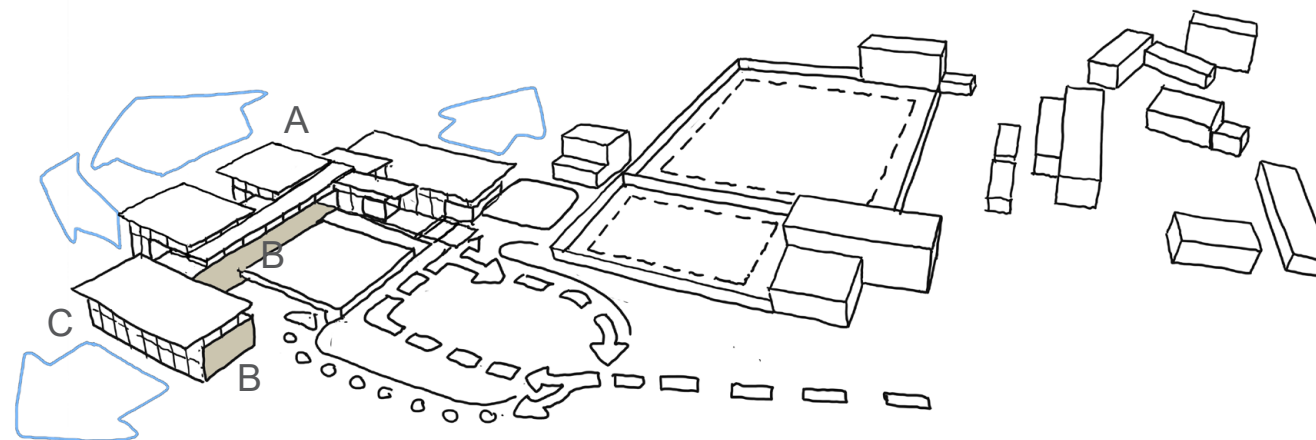
DETAIL

The form and detail of the dwelling is refined

A The roofs to each wing are focussed onto the site and views. These are detailed as 'planar' roofs to float above the secondary massing

B Solid. Local stone masonry walls are introduced

C Open. The principal views into the site feature the most glazing



4.4 LAYOUT AND AMOUNT

Unlike the existing dwelling, which is arranged over four floors including the basement, the proposed replacement dwelling is arranged over just two.

Access to the front door is at the upper level, through planted landscaping via a porte cochère/loggia leading to an entrance lobby (A). From here, there is direct access to the other parts of the house and views through the pool building (E), as well as southward through the double-height living space (B) to the garden and views beyond. Access to the living space is via a staircase, from which circulation leads through a small gallery to the kitchen (C). Both the main living space and the kitchen enjoy views of the formal gardens and distant southern vistas. To the east of the kitchen is the more formal dining area (D), which will benefit from views over the reworked parkland to the east.

The dwelling also has external access to the lower level via an undercroft parking area (L), providing covered access directly into the dwelling. This also includes a wet entrance for access with muddy boots, dogs, etc.

To the west of the dwelling is the main pool building (E), which includes a sitting room (J) with access to an adjacent external terrace.

At the upper level, the linear corridor provides access to the primary bedroom (F) and family bedrooms in the east wing (G). The upper level also includes a guest bedroom (H) and a smaller sitting area (N), offering elevated views.

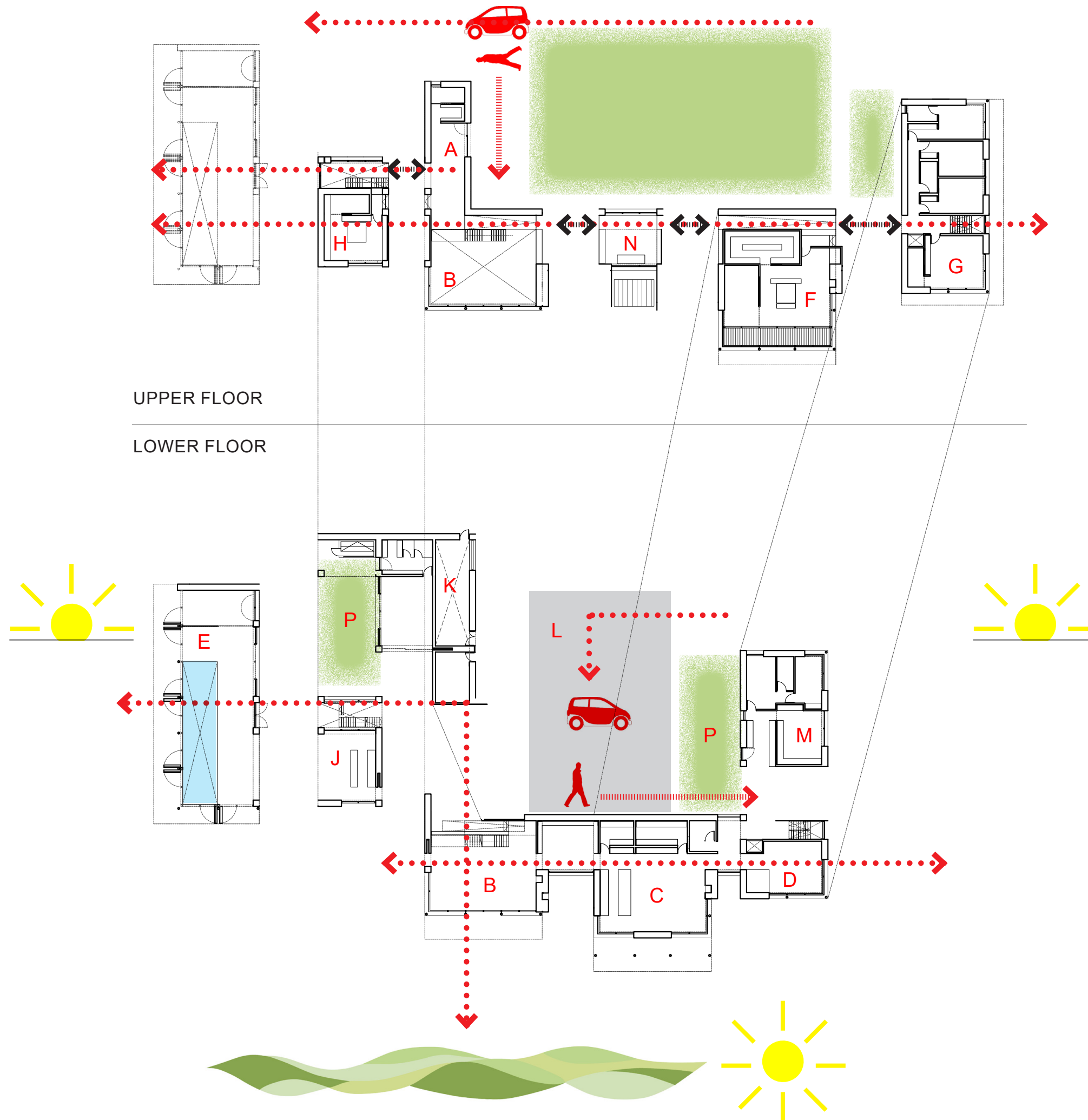
Support spaces are placed to the rear of the plan (K) and include storage, plant rooms, entertainment area and changing facilities for the pool wing. Additional support space is provided within the east wing (M), which accommodates staff and a utility room.

The design has been carefully formulated to create spaces of varying heights, responding to the needs of each area. This has required subtle sectional changes, which are linked with ramped access to ensure ease of access for ambulant/disabled occupants.

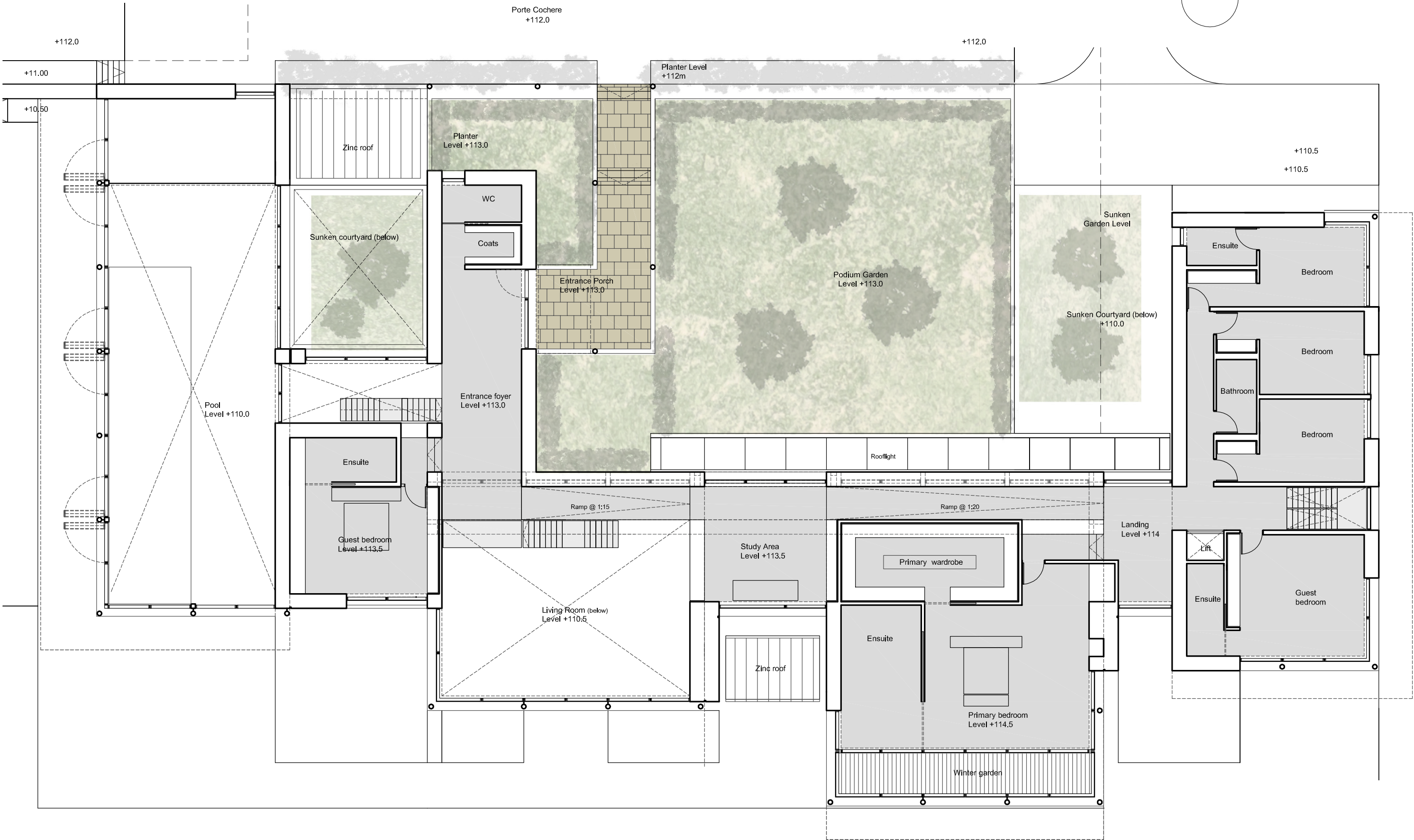
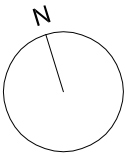
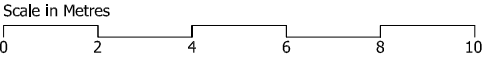
A feature of the plan, as shown in the adjacent diagram, is the extended views through the plan into the parkland beyond. The careful placement of sunken courtyards (P) also allows light and landscaping to filter into the dwelling.

The proposed gross internal area is 1,354 sqm. A full area schedule is given in appendix B at the end of this document.

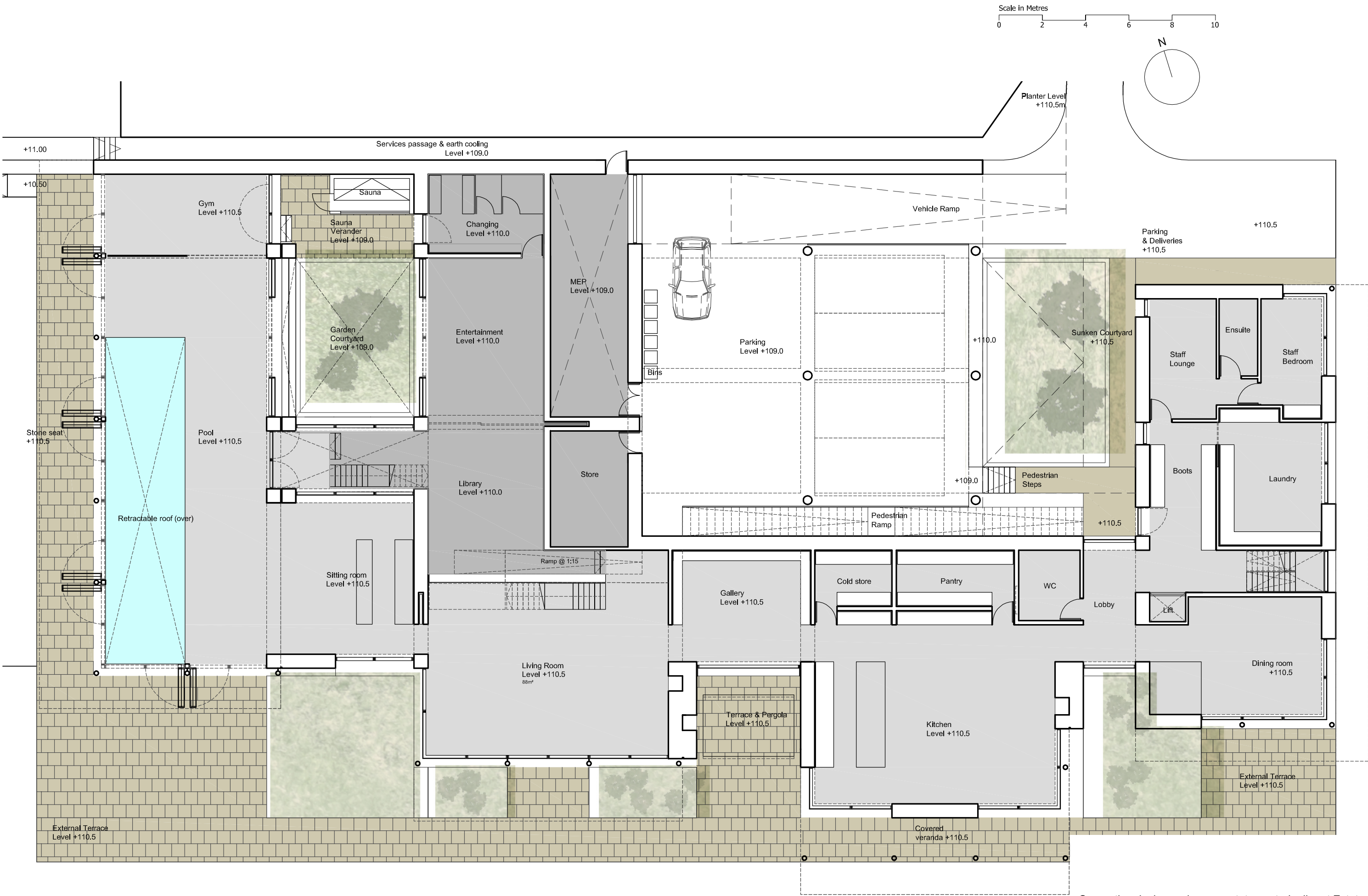
Further details are provided in the plans on the following pages and within the submitted documents.



4.5 UPPER FLOOR PLAN



4.6 LOWER FLOOR PLAN



4.7 PROPOSED MATERIALS

Where possible the proposed dwelling utilises materials that are locally sourced to not only reflect the local vernacular but ensure the embodied carbon in the project is minimised. The use of local materials will also reinforce ‘local distinctiveness’. Further details of the use of local stone are given on the following page.

It is proposed that the dwelling makes use of a heavy base with lighter form of construction above. The base would be formed of waterproof RC concrete to form the substructure. Above this a highly insulated engineered light weight timber frame with primary steelwork utilises blown timber insulation to ensure the new dwelling meets the exacting Passivhaus requirements. Externally the dwelling will have walls faced in the local stone and soffits of timber battening.

Glazed panels would be triple glazed and adjacent panelling matched to the colour of the frames.

External blinds are detailed into the facade on the east and west facades to mitigate heat gain.

It is proposed that the Zinc standing seam roof would be of a ‘brown’ muted colour to remain in keeping with the location. Areas of flat roof will be constructed as hay based downland ‘green roofs’ providing an enhanced ecological habitat, whilst minimising rainwater runoff.

Reference has already been made to the High Weald AONB ‘Guidance on the final selection of colour’. The selection of Local Stone, Brown Zinc, PPC window frames to match (RAL 8025) and Natural Timber are consistent with the adjacent palate of colours highlighted as being most prevalent and consistent within the AONB. These colours have also been selected with due regard for the location within both a landscaped and developed setting.

The dwelling has been designed to be capable of meeting the Passivhaus standard for the benefits previously highlighted. It is noted that he selection of materials and subsequent careful specification and detailing (insulation levels, MVHR, triple glazing etc) would already conform to the Passivhaus requirement for these individual elements.



4.8 STONE WALLING

It is proposed that the scheme makes extensive use of local stone as a primary material within the construction of the dwelling. Some concern was raised in the pre-plannign comments as to the supply of Horsham Stone as a local material. However, it has been confirmed, in conversation with the quarry, that there is no issue with the supply of Horsham Stone for the project. It is also believed that the use of this local material may assist with its wider use elsewhere in the vicinity of the project.

Horsham Stone is a type of sandstone featuring a ripple like marked appearance. The stone is quarried from a circa 2km long band around the town of Horsham with the quarry located approximately 10km from the site.

Alternatives would be the use of Fittleworth or Wealden stone. It is suggested that the final selection can be subject to a condition alongside the other external materials.

The stone can be used in rough form or more precisely cut and once prepared will harden to form a material that will last hundreds of years. The stone can be used for walling, roof tiles and landscaping. Care needs to be taken with all sandstones to ensure there will be no problematic staining (as it's a porous material). The selection of a local stone is, however, a desirable material for the project as the tonal colour aligns with the High Weald colour palate as highlighted on the preceding page.

Along with the local stone, where possible, local materials will be utilised along with trusted local companies. The demolition of the existing dwelling will be undertaken to ensure the re-use of materials where possible within the new build and wider estate - a schedule of re-use is given at the end of this document in Appendix C.



Some photographs from a visit to the Horsham quarry and yard to confirm the viability of supply for the project. A few of the photographs from this visit are shown here. Local alternative stones will also be explored prior to the selection of a final material. It is suggested this exact specification can be secured by way of condition.

4.9 DARK SKIES

The dwelling has been designed with a consideration for the High Weald Dark Skies policy/ management plan (2024-2029) and due regard for minimising light pollution.

Rooflights have been wholly omitted and glazing will be largely focussed to the south, where external blinds can be included to omit light spill and provide enhanced shading.

Any external lighting will be limited to low level sensitive way finding luminaires that also negate impact onto the site's ecological habitat. In accordance with the High Weald Dark Skies Technical Guidance the glazing will be subject to a VLT of between 0.4 and 0.65.

The design has been assessed by Ion Consulting Engineers and their report is submitted with this application. Ultimately the detail of any lighting scheme can be secured by way of condition.

A fundamental driver for the replacement dwelling at the Lydhurst Estate is its approach to sustainable design.

The application has been developed alongside a PHPP Passivhaus assessment. This has confirmed that the dwelling could be constructed as a fully certified Passivhaus and that the energy consumption can be met by the proposed photovoltaic array combined with the approach to renewable technologies. The verification page from the PHPP assessment is given in appendix A.

Passivhaus is the fastest growing energy performance standard in the world with 40,000 certified buildings constructed since the standard was introduced in 1991. Compared to a standard house in the UK one that is designed and constructed as a Passivhaus typically achieves an 85% reduction in energy consumption and an 80% reduction in carbon emissions. This is achieved through a detailed, independently verified Passivhaus design process which guides the whole scheme towards an efficient, low energy solution.

The Passivhaus standard's strengths lie in the simplicity of its approach; excellent thermal performance, exceptional airtightness with mechanical ventilation providing pre-heated fresh air.

The following key factors have influenced the decision to utilise Passivhaus design for this project.

ENERGY

A Passivhaus must have a maximum space heating and cooling demand of less than 15 kWh/m² a year or a maximum heating and cooling load of 10W/m². A house built to the latest Part L requirements would be expected to have a space heating demand of at least 55 kWh/m² a year, in practice this figure will often be more than double this figure.

In addition a Passivhaus must have a maximum total primary energy demand requirement; including lighting and fixed appliances, of 120 kWh/m²/year which ensures that fittings are specified to be low energy and high performance. This ability to substantially reduce the energy consumption through Passivhaus design makes it possible to create a Net Positive Energy Building.

COMFORT

A Passivhaus is fundamentally a dwelling which is comfortable for the occupants. The standard requires that buildings achieve an air change rate of no more than 0.6 air changes per hour @ 50 Pa. Cold draughts are therefore negated. High performance windows and insulation mean that the cold radiant effect of poorly insulated windows, walls and floors are eliminated thus creating a space where an occupant can feel warm without the need to turn up the thermostat.

A key metric of the Passivhaus design is that the house should maintain a minimum temperature of 16°C without any additional heat input. Summer over-

heating must also be kept to a minimum in order to satisfy the standard. The use of continuous mechanical heat recovery ventilation (MVHR) also guarantees improved air quality; many Passivhaus residents have shown marked improvement in respiratory ailments like Asthma and COPD as a result.

QUALITY

As a measured, independently certified standard, Passivhaus certification ensures that the design aspiration and as-built performance of the buildings are the same. As a comparison BRE research has shown that for many new buildings in the UK this discrepancy can be as much as 50-100%. Unlike other energy standards the Passivhaus certification also requires the thermal modelling of key construction details to ensure that excessive thermal bridges are eliminated. This also helps to guarantee that cold spots, condensation risks and mould growth are eradicated. The key products specified for Passivhaus projects such as windows and the MVHR are also independently certified to guarantee that their performance matches the design.

ECONOMY

Like all low-energy homes a Passivhaus has lower fuel bills than a standard house. However the Passivhaus energy requirement is specifically calculated to require the optimum investment in thermal fabric improvements for demonstrable energy savings. Less investment reduces the potential energy savings and any further investments reap fewer savings for the money invested. The robust approach to building design means the heating requirement in a Passivhaus is reduced to the point where a traditional heating system is no longer considered essential. Many use a heated towel rail as the sole source of heating, this heat is then recovered and circulated by the Mechanical Ventilation and Heat Recovery unit. The omission or reduction of a traditional heating system represents a saving in the overall build costs.

FLEXIBILITY

Although originally a central European development, the Passivhaus standard can be applied to any climate in the world and works equally as well in warm climates as it does in more moderate climates. Passivhaus is particularly suited to the UK, where our more moist climate eliminates the need for additional humidification.

SIMPLICITY

The fabric-first approach and low-energy demands of a Passivhaus mean that it relies less on the behaviour of the occupants. Studies of the Passivhaus buildings in use have shown that the average energy use remains at 15 kWh/m²/year irrespective of the occupants' attitudes to heating and ventilating etc. The reduction in heating installation reduces the requirement for continuing maintenance and the controls for most MVHR systems are as simple as the average kitchen extractor.

4.10 WHY A PASSIVHAUS APPROACH?



As a practice MELOY Architecture & Design have extensive experience of Passivhaus design in landscape settings. Three of the practices fully certified Passivhaus projects are shown above.

1. Hill House Passivhaus in Lewes was the first fully certified Passivhaus in the South Downs National Park.
2. The Mile House in Amberley responds to a challenging north facing site to achieve a fully certified Passivhaus.
3. Hillside in Fulking nestles into the foot of the South Downs escarp and uses green roofs to integrate the dwelling within the wider landscape.

4.11 SUSTAINABILITY & PASSIVHAUS

The diagrams on the following pages demonstrate specific principles that will be used in the scheme to achieve the high level of sustainability proposed. These measures were seen as acceptable within the pre-planning response.

The requirements of a Passivhaus are such that the external envelope will be highly insulated and air tight. In addition to this the form and location of glazing are designed to allow for appropriate solar gain whilst minimising heat loss. A Passivhaus also needs to meet strict energy targets and utilises mechanical ventilation with heat recovery to circulate fresh air around the dwelling.

INSULATION

To ensure minimal heat loss the thermal performance of the external fabric is a key aspect in the design of a modern sustainable dwelling. Where practical the approach to the construction of the new dwelling is to use sustainable forms of wood insulation which is also consistent with setting and light weight approach to construction where applicable. The proposed external walls are at least 420mm thick with wood fibre board insulation to the external face and a blown wood fibre insulation. The result is a highly insulated wooden external fabric (<0.1w/m2k) that can naturally breath outwards.

AIR TIGHTNESS & FORM FACTOR

The extent of surface area to volume means there is a greater potential for heat loss and gain through the external facade. The new dwelling has been assessed using the Passivhaus Planning Package (PHPP) to calculate thermal loss in relation to the form factor of the dwelling. This has verified that the dwelling can be constructed as a fully certified Passivhaus.

A further impact of the form factor is the ability of the dwelling to lose heat through small gaps in the facade. This airtightness is recognised as being equally important as that of the thermal performance in the ability of any building to minimise heat loss. The Passivhaus approach requires high levels of air tightness to minimise this loss. A good analogy here is the concept of a candle in a tent. The ability of the small heat source to impact the internal temperature of the tent is a result of the ‘zipped’ up nature of the enclosure.

The external fabric of the new dwelling features an internal air tight racking board. This allows the structure to be structurally efficient with a robust approach to airtightness just requiring the use of a tape to seal the joints between boards. The resultant airtightness will be less than 0.6 air changes per hour which is roughly ten times more air tight than the existing regulatory requirements. This approach reduces the energy demands of the building allowing for the passive design to provide the majority of thermal input. Whilst the dwelling is spread out as a plan arrangement it will be able to perform efficiently with regards to airtightness as this is a function of the external envelope to volume.

SOLAR ORIENTATION AND SHADING

The design responds to the site through the careful placement of the glazing into the facade. This allows for both framed and extended internal views.

The dwelling mitigates problematic heat gain through the use of projecting canopy roofs. These will restrict high angle summer sun but then allow for low angle winter gains. In addition each window can have integrated external venetian blinds to eliminate overheating. This approach also minimises the impact of any glazing with regards to light spill.

A common misconception with Passivhaus design is that windows cannot be opened. In fact, as with any house, they can. The only difference being that good Passivhaus design will limit the potential for overheating meaning that windows can be opened for enjoyment rather than to overcome discomfort. Should there be periods of excessive heat during summer then night time purge ventilation can be employed.

All windows will be triple glazed and have a high level of wind resistance. The detailing of the frames will be thermally modelled to ensure the correct placement within the facade to ensure heat loss is minimised. Typically this is halfway within the depth of the wall to ensure heat loss is not ‘pulled’ out of the dwelling.

MVHR

Modern airtight dwellings require Mechanical Ventilation Heat Recovery to remove stale air whilst retaining energy through a heat exchanger. This necessity is also a requirement for any Passivhaus. It is proposed that the MVHR unit is placed within the lower level with ducting through the floor build up to terminals in each room.

RENEWABLE TECHNOLOGIES

The approach to thermal design will result in a dwelling that is a Net Positive Emissions Building. The design will use heat pump to allow for the generation of hot water. This will provide for both space heating and domestic hot water. Heat pumps are highly efficient and produce more energy than they use. Most have a rating of at least 300% meaning for every unit of power consumed three are generated for free.

To reach Net Positive Energy the annual energy consumption will be offset through a significant photovoltaic array on the roof. The array will be backed up by battery storage.

In addition to the above strategy it is proposed that a number of direct air sealed wood burning stoves are placed within the dwelling. These will provide comfort and back up heating in extreme weather conditions.

OTHER MEASURES

Water will be managed to reduce usage through the specification of appliances and fittings. In addition it is proposed that the provision of brown water reuse is explored as part of the detailed sustainability assessment.

Low energy LED light fittings will be specified throughout the dwelling and external lighting is restricted to extremely low level way finding.

Whilst the Passivhaus standard is still relatively uncommon in the UK it has become recognised as the most effective means of addressing both climate change and the predicted shortage of fossil fuels. The strength of a Passivhaus is its independent certification that avoids the ability to simply ‘greenwash’ a scheme. In combination with the additional sustainable measures as highlighted here, it is felt that the proposal would assist in the message of sustainable design.

METALWORK:
Zinc metalwork is 100% recycled with approximately 98% of a newly rolled sheet containing recycled content. The colour aligns with the High Weald colour palettes highlighted in section 4.7

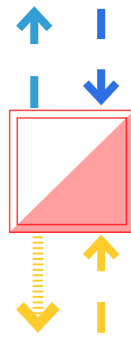


INSULATION:
All above ground insulation is wood based with wood fibre blown insulation between the timber frame and an external wood fibre sheathing board

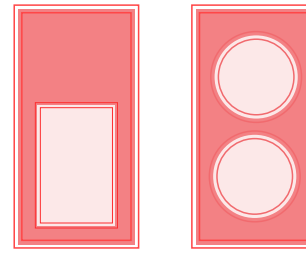


HEATING AND HOT WATER

MVHR:
Mechanical ventilation with heat recovery unit maintains stable environment through introduction of fresh air and the removal of stale air whilst retaining the heat within the house. An underground air tube can raise the temperature of incoming air using the naturally retained heat in the ground



WOOD BURNING STOVE:
Further space heating can be provided via the planned wood burning stoves.



GSHP:
Heating of hot water for both taps and underfloor heating will be undertaken via a ground source heat pump. This allows for a highly efficient use of electricity as the primary energy source.

4.11 SUSTAINABILITY & PASSIVHAUS

The diagram below demonstrates the specific principles used in the scheme that use the Passivhaus standard to achieve a net positive energy building (NPEB).

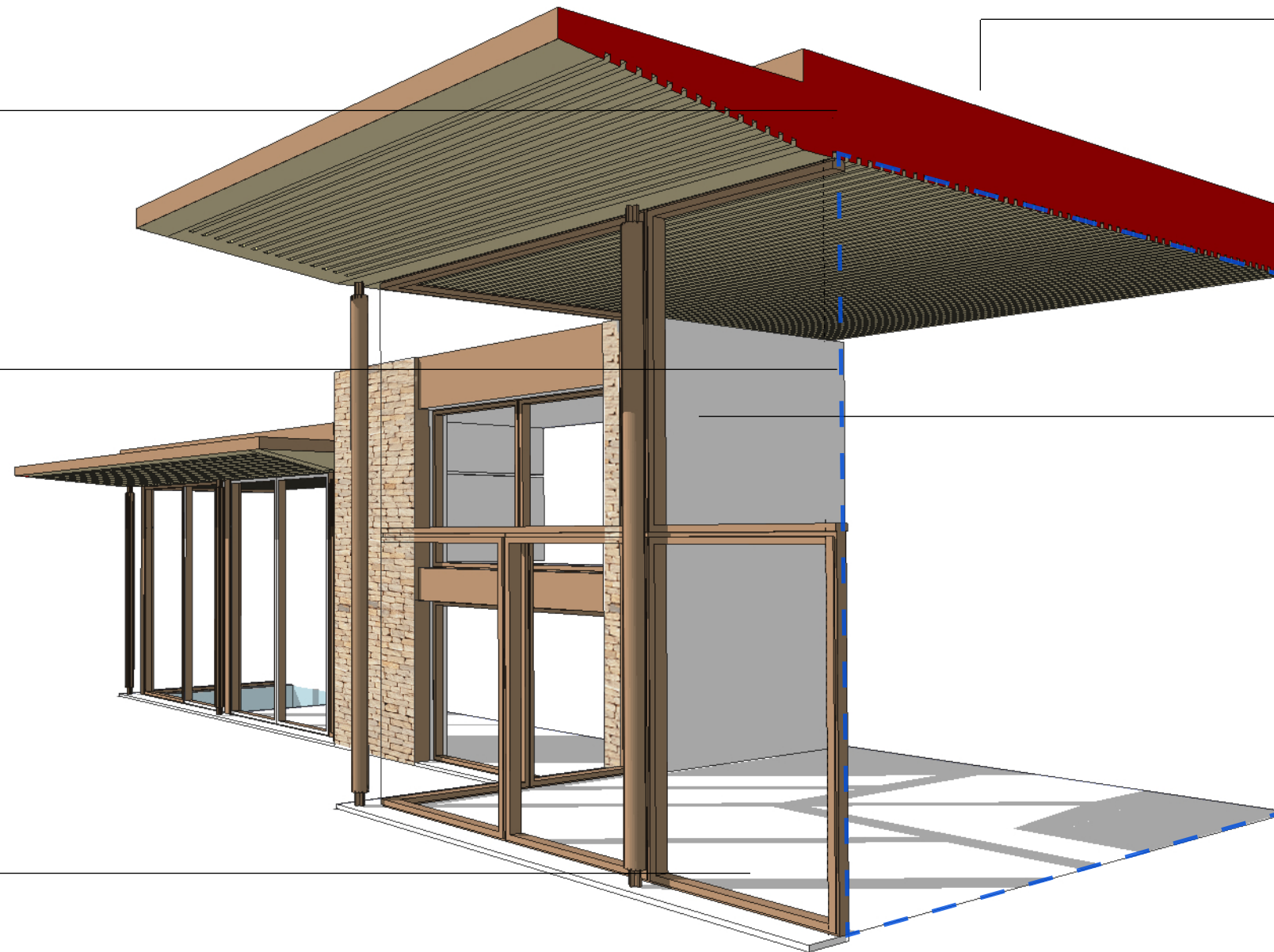
The proposed has been subject to an assessment and verification using the Passivhaus Planning Package (PHPP) - confirmation of this initial Passivhaus assessment is given in appendix A. In conjunction with the assessment by ION consulting this has confirmed that the energy consumption will be met by the proposed renewables strategy with the dwelling ultimately designed to represent a yearly net gain in energy consumption.

ROOF AND WALLS:
The building is wrapped in very high levels of insulation - A notional minimum U-Value of $<0.15\text{W/m}^2\text{K}$ is recommended with a value of $0.1\text{W/m}^2\text{K}$ proposed.

AIR TIGHT:
Air leakage through the external envelope is restricted to 0.6 air changes per hour ($0.6\text{ ac/h @ }50\text{ Pa}$) and is typically 20 times more airtight than a traditional build.

LIGHTING GENERALLY:
Low energy recessed warm white LED lighting is proposed in the dwelling.

FLOOR:
Very high levels of insulation minimise heat loss through the floor U-Value value of $0.1\text{W/m}^2\text{K}$ proposed.



PHOTOVOLTAIC PANELS:
To allow the design to be net positive a large photovoltaic array is proposed on the roof of the new dwelling

ENERGY:
The reduced energy use of the house allows the proposed renewable technology to produce enough energy to ensure the dwelling will achieve net zero emission.

GLAZING:
Some spaces will benefit from useful solar gains. To minimise heat loss windows are highly insulated triple glazed, low E windows within thermally broken frames. In addition to the primary heating and solar gains the house will retain heat generated from the occupants and white goods.