Appendix

Key Points

- To create a functional, diverse and low maintenance SuDS scheme and wetland system adjacent to the existing brook to protect it from stormwater discharge and pollution from the development.
- Existing landscape features were retained and new habitat for wildlife created through the SuDS design.
- Rainwater run-off is collected from the roofs and paved areas via a network of pipes and stored in a rainwater harvesting tank, where it is pumped into the building to flush toilets. This helps reduce the volume of water within the storm water management system, helping to reduce flood risk.
- The SuDS design for the storm water involves a series open swales that feed into a wetland system, with the lower part of this a reed bed. Each treatment stage is separated by gabion baskets, each filtering and cleaning the water before it eventually reaches the existing brook and natural drainage system.

Project Details

- **Project Name:** Kington Medical Practice
- **Landscape Architects:** DSA Environment & Design
- **Engineer:** Couch Consulting Engineers
- **Architects:** West Hart Partnership
- **Main Contractor:** Vinci Construction UK Ltd
- **Completed:** 2012

Image 78: Swale

Image 79: Entrance

- The shallow and curvilinear contoured swale design ensured these areas integrate with the overall landscape scheme and allow for easy maintenance.
- All SuDS were future-proofed and designed for a critical 100 year + climate change storm event.
- New planting was, in the main, native along with the grassland and wetlands as part of the storm management system. The wetlands were planted with marginal aquatics. Grassland beyond the wetlands is designed to require less management, creating a 'wet meadow' setting. Finally native shrubs and trees unify the scheme.
- An otter holt was built, along with hazel planted for dormice to further encourage wildlife and are special features of the scheme. Ultimately the biodiversity of the site increased greatly.
- A Landscape Management Plan was conditioned by Herefordshire Council for a minimum of 5 years. This has been successfully implemented and has ensured the scheme developed and continues to perform as intended, playing a vital role in the success of this scheme.
- The reduced need for underground pipes and engineered drainage solutions resulted in cost savings.

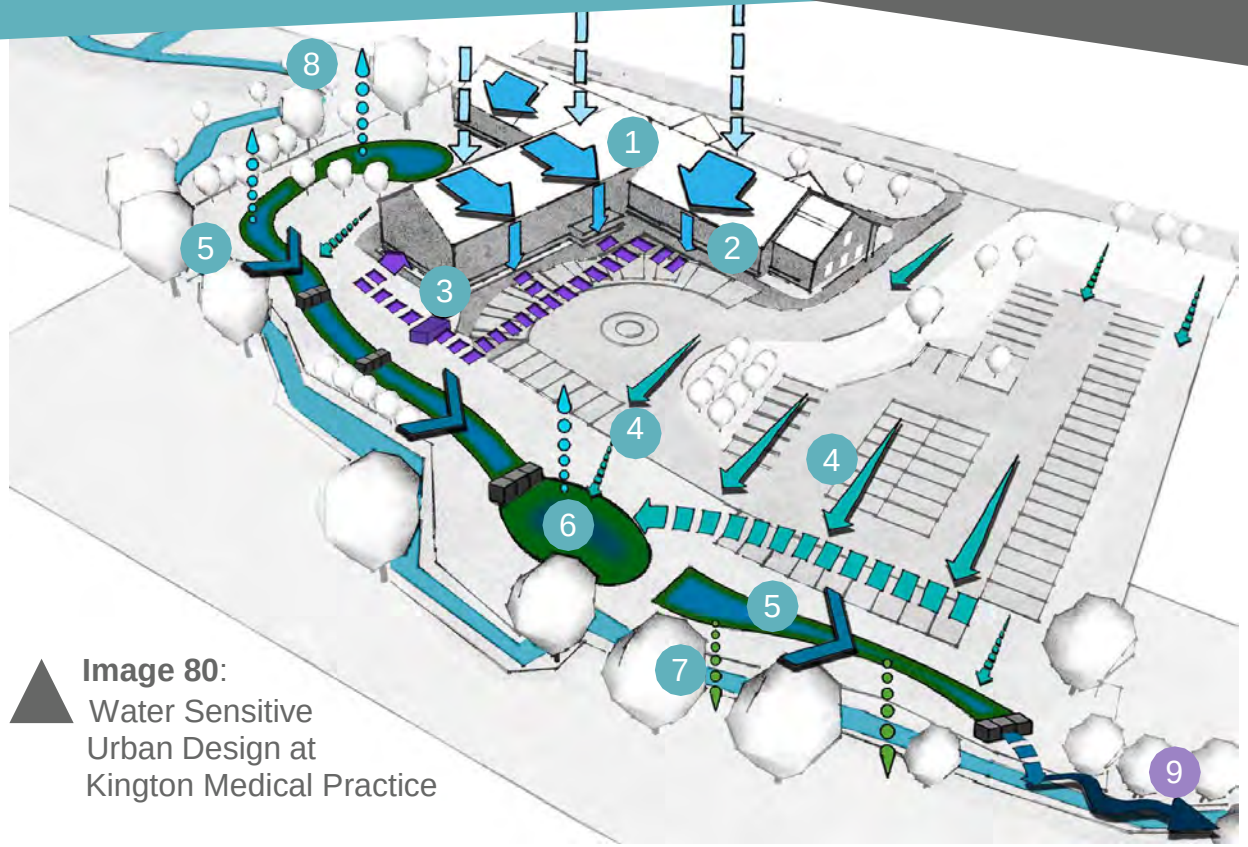

Image 80: Water Sensitive Urban Design at Kington Medical Practice

1. Rainwater collected on rooftop
2. Roof water conveyed via downpipes
3. Roof water harvested and reused as 'greywater' in the building
4. Stormwater collected from hard and soft surfaces and controlled through landscape design
5. Swales convey collected water
6. Water is held, using flow control, in attenuation basins
7. Water is encouraged to infiltrate into the natural ground where it recharges groundwater
8. Plants allow evapotranspiration of water back into the air
9. Controlled outfall into the surrounding drainage system

Project Details

- **Project Name:** Beacon View, Colwall
- **Architects:** Architype
- **Engineer:** Andrew Collinson
- **Mechanical & Electrical Consultant:** Alan Clarke
- **Landscape Architects:** Reckless Orchard Landscape Consultants
- **Contractor:** Mike Whitfield Construction
- **Completed:** 2021

Image 81: Entrance

Image 82: Green Roof

Key Points

- 3 detached Passivhaus homes that include a PV array, ASHP and MVHR unit
- Position of houses was to enable as much of the footprint of the existing house to be reused, retain an established mature oak tree and orientate the houses to maximise solar gains
- The houses are low in embodied carbon with timber frames, recycled newspaper insulation along with triple glazed windows and doors
- Bicycle storage is incorporated into the house layouts
- The scheme embraces a sustainable drainage strategy using permeable hard surfacing materials with an attenuation pond in the rear field

Image 83: Rear Elevation

Project Details

- **Project Name:** Wahroonga, Ledbury
- **Architect:** Janet Cotterell (CT & T architects, London & Passivhaus Homes)
- **Energy Consultants:** Nick Grant & Alan Clarke
- **Contractor:** Mike Whitfield Construction Ltd
- **Completed:** 2012

Image 84: Front Elevation

Image 85: Rear Elevation

Key Points

- A detached family home built to the Passivhaus standard
- The property has a highly insulated timber frame using sheepswool and recycled newspaper insulation.
- Certified Passivhaus windows and doors were used
- Natural daylight is emphasised with dual aspect daylighting in each room
- The specification includes: water saving and A+ rated appliances, micro-bore hot-water piping and low energy lighting throughout,
- 5sqm of solar thermal panels for hot water heating are included on the reclaimed Welsh slate South East facing roof

Image 86: Interior View

Project Details

- **Project Name:** Hope View House, Malvern
- **Architects:** Warren Benbow
- **Energy Consultants:** Nick Grant & Alan Clarke
- **Engineer:** Allan Pearce
- **Contractor:** Covenhope Construction Ltd
- **Completed:** 2017

Image 87:
Interior View, Passivhaus Trust

Image 88:
Exterior View, Passivhaus Trust

Key Points

- Built on a steeply sloping site in an AONB, Hope View is designed to be a part of and sit within the landscape, nestling into the contours.
- There are three key components to the concept: trees, meadow, house. The upper part of the site has been planted by the clients with over 1200 deciduous trees, whilst the lower part of the site has been replanted as wildflower meadow and orchard.
- An attenuation pond and swales were designed within the landscape to deal with the surface water drainage.
- The property is Passivhaus, with an MVHR unit installed for ventilation and high levels of insulation.
- All living space faces south, benefiting from views and natural daylight with summer solar gains controlled by the inclusion of a continuous covered walkway, creating a large overhang in front of the windows.
- A PV array generates electricity, with a GSHP installed for heating (supplied underfloor) and hot water and. The soakaway drainage field from the sewage treatment plant passes through the GSHP drainage field to add extra “energy” into the ground.
- The stone on the south facing elevation was locally sourced.

Project Details

- **Project Name:** Grove Cottage, Hereford
- **Architects:** Simmonds Mills
- **Energy Consultant:** David Oliver
- **Mechanical & Electrical Consultants:** Alan Clarke, Peter Warm
- **Engineer:** Bob Johnson
- **Contractor:** Eco-DC
- **Completed:** 2009

Image 89: Front Elevation

Image 90: Rear Elevation

Key Points

- The first sustainably renovated property to be certified to the EnerPHit standard in the UK.
- Although improvement measures were applied to the whole property the approach was to ensure the front elevation would retain as much of the original character as possible to demonstrate how energy efficient measures can be applied without impacting on the original architecture. The rear elevation moves away from this idea, focussing on a design to benefit from solar gains and daylighting and include a new extension.
- Daylighting to all rooms displaces the need for electric lighting. Daylight is maximised through careful sizing and design of windows and internal colour scheme. Some windows have splayed reveals which increases light distribution and levels.
- The existing building is insulated externally with either a render or western red cedar cladding from a local woodland and processed by a local sawmill.
- Reclaimed and FSC certified timber was used, along with the reuse of roofing slates and inclusion of extensive living roofs to improve biodiversity.
- Water-efficient appliances and sanitaryware were installed along with a PV array.

Project Details

- **Project Name:** Twyford Barn, Twyford
- **Architects:** Architype
- **Engineer:** Roger Gell
- **Water & Energy Consultant:** Elemental Solutions
- **Contractor:** Mike Whitfield Construction Ltd
- **Completed:** 2006

Image 91: Exterior View, ©Architype

Image 92: Interior View, ©LeighSimpsonPhotographer

Key Points

- An existing set of barn buildings converted into a sustainable work place
- Locally sourced and healthy materials were used inside and out with local chestnut for interior timber along with natural paints and stains and Douglas Fir cladding externally with the original stone, reclaimed and revived
- The building is designed with water efficiency at the heart and includes an airflush toilet system
- A biomass boiler is installed for hot water and heating, due to the remote location and available space.
- The landscaping is designed to blend with the natural setting and extend local biodiversity.

Image 93: Cladding Materials, ©LeighSimpsonPhotographer

Project Details

- **Project Name:** Portfield Street, Hereford
- **Architects:** Simmonds Mills Architects
- **Engineer:** BJSE
- **Contractor:** Alzeco Build
- **Completed:** 2021

Image 94: Rear Elevation

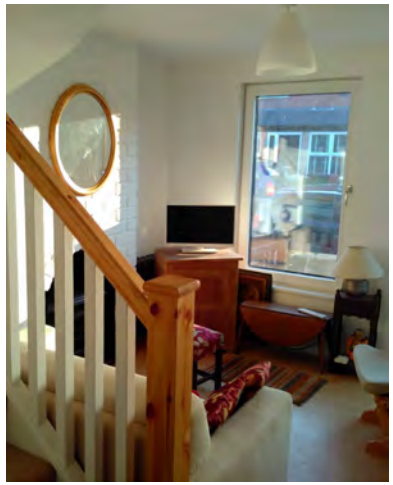

Image 95: Living Space

Image 96: Rear Elevation

Key Points

- Residential extension and renovation project to improve the energy efficiency of an existing end of terrace property
- During design and construction decisions were made to minimise waste, with existing materials reused where possible. Timber removed from the existing house was denailed, salvaged and stored for reuse
- Existing finishes were also retained where possible, old surfaces cleaned and repaired, cracked lime plaster ceilings repaired rather than replaced, wall lime plaster cleaned with internal wall insulation installed over
- The PHribbon, a programme that can be added to the PHPP software was used to complete a lifetime carbon analysis. Decisions were made to reduce embodied carbon including the use of SIPS panels which were 60% recycled feedstock from the food industry, galvanised ground screws instead of concrete foundations, internal wall insulation made from corn starch bound silicate boards, recycled newspaper insulation to the attic and a rainscreen cladding chosen that precluded the need for exterior roof and wall breather membranes

Project Details

- **Project Name:** Staunton-on-Wye Endowed Primary School
- **Architects:** Architype
- **Mechanical & Electrical Consultant:** Ernest Griffiths
- **Engineer:** Ramboll
- **Landscape Architect:** Hannah Genders Landscape and Planting Design
- **Contractor:** Thomas Vale Construction Plc
- **Completed:** 2010

Image 97: Exterior View, ©LeighSimpsonPhotographer

Image 98: Hall, ©LeighSimpsonPhotographer

Key Points

- The design reflects the eco-friendly ethos of the school community, with sustainability embedded within their curriculum
- A biomass boiler provides heating and hot water
- The building is constructed from a simple and robust palette of natural materials, including local stone, timber cladding, timber windows & doors and green roofs externally, and timber screens, natural linoleum, and organic paints and stains, internally.
- The design achieves good day lighting levels and cross ventilated air flow throughout the building whilst minimising heat gains. Overheating is controlled by the angle and location of the glazing and by the roof overhang on the South.
- The external fabric of the building is highly insulated with good air-tightness and minimal cold bridging to reduce heat losses and therefore minimise the heat input required to create a comfortable, low energy building.

Project Details

- **Project Name:** Hereford Archive & Records Centre, Rotherwas, Hereford (HARC)
- **Architects:** Architype
- **Mechanical & Electrical Consultants:** E3 Consulting Engineers
- **Conservation Physics & Energy Consultant:** Elemental Solutions
- **Engineer:** Eastwood & Partners Consulting Engineers
- **Landscape Architect:** Churchman Landscape Architects
- **Contractor:** Kier
- **Completed:** 2015

Key Points

- The UK's first archival storage to be built to the Passivhaus standard
- Solar gain is controlled using brise soleil and the highly insulated building fabric. Lighting loads are control by a combination of switching, daylight and absence control.

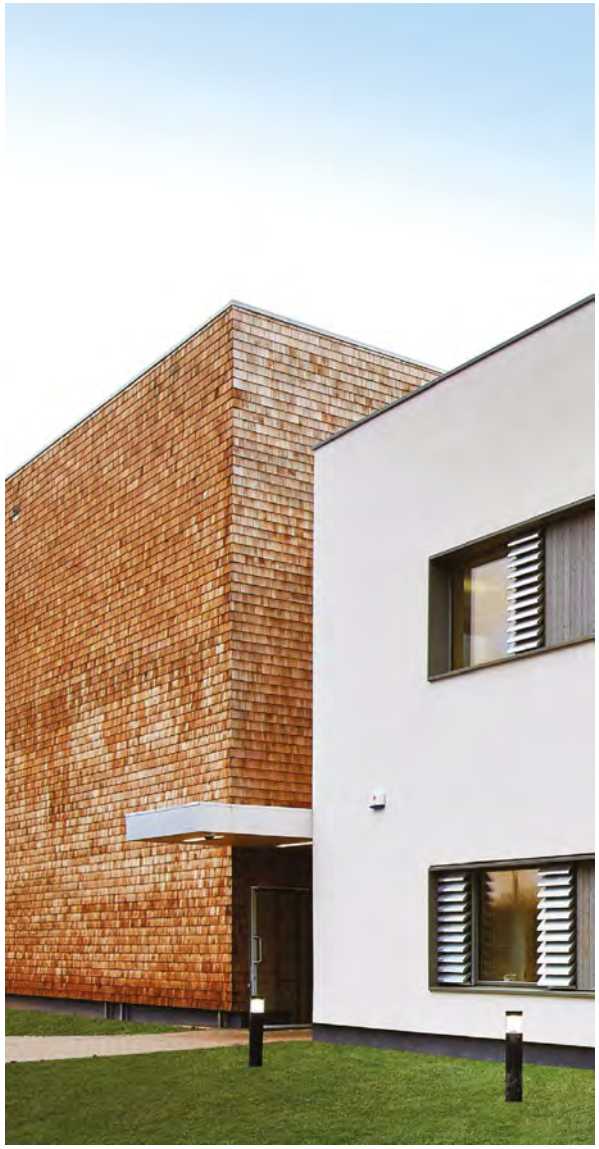

Image 99:
Entrance, ©KierConstruction

Image 100:
Atrium, ©KierConstruction

- The stringent fire safety demands of the building required the core to be concrete, with the remaining building timber frame. However, the fabric first approach, with high levels of insulation has led to an estimated 60-70% reduction in operational energy and carbon
- Summer ventilation is controlled by users who can open windows and insulated secure louvres. Cross ventilation into the atrium space via attenuated air paths is drawn by stack effect through actuator controlled high level openings. This also provides night purge cooling, supplemented if required by mechanical ventilation, to further drive down running costs.
- The landscape design includes areas such as wildflower meadows to increase biodiversity along with a ditch on two elevations that attenuate the site surface runoff whilst also providing a natural habitat
- Located to provide a civic presence to Holme Lacy Road, the site is sustainably accessible, by bus, bike and foot via the sustrans/connect2 bridge over the River Wye

Image 101:
Storage, ©KierConstruction

Image 102 :Internal Entrance, ©KierConstruction

Project Details

- **Project Name:** Garway Village Hall, Garway
- **Architects:** Simmonds.Mills Architects
- **Energy Consultant:** Alan Clarke, Infrastruct
- **Engineer:** BJSE
- **Contractor:** William Powell and Sons
- **Completed:** 2018

Image 103:
Exterior View, ©William Powell

Key Points

- A Passivhaus certified community centre, providing manyfunctions for the village including a large multi-functional hall with full stage / green room etc; an outreach medical centre; a cafe/bar and part-time post-office
- The building is constructed using a glulam frame, with exposed timber and insulated using blown mineral fibreinsulation.
- A mix of timber cladding and render is used externally with a PV array on a galvanised steel roof, the later paying reference to the rural context and the old hall. APV array is installed on the south facing roof.
- To minimise surface run-off, porous surfaces, including inthe parking area, were specified.

Image 104: **Garway Hall, ©William Powell**

Project Details

- **Project Name:** Larch Corner Passivhaus, Warwickshire
- **Architects:** LEAP
- **Passivhaus Consultant:** Alan Clarke
- **Engineer:** Tribus, Airey and Coles
- **Contractor:** Mac Eye Projects
- **Completed:** 2018

Image 105:
Living Roof and PV Array, Passivhaus Trust

Further Information

- 2021 UK Passivhaus Awards
- 2020 ASBP Awards Finalist
- Desirable Homes Webinar

Building performance

- **Form Factor:** Improved from original planning submission design, which was overly complex. Reduced to a smaller form factor of 3.9 (although it is worth noting this reduction was limited by project constraints, and therefore is still high and not best practice).
- **Daylighting:** Optimal window size was calculated to improve thermal performance, while maintaining sufficient daylighting, leading to a reduction in window size from the original planning design.
- **Overheating:** Indoor and outdoor temperatures were measured over a 12 month period. The living room was over 25 degrees Celsius 10% of the time. PHPP suggests 9%, however good practice is less than 5%.
- **MVHR:** Includes Mechanical Ventilation with Heat Recovery (MVHR).
- **Superinsulation:** ~360mm thick wood-fibre insulation between timber I-beams and an additional 80mm insulation on top.
- **Airtightness:** 12 x more airtight than required by Passivhaus and 244 x more airtight than Building Regulations, with a record-breaking airtightness result of 0.047ach@50pa. Larch Corner is one of the UK's most airtight dwellings, with the equivalent leakage area fitting on a 1-penny coin.
- **Natural Materials:** In addition to the use of timber throughout the project, Larch Corner also used low VOC (volatile organic compound) finishes including wood wax.
- **RIBA 2030 Climate Challenge:** Embodied carbon at 383.1kgCO^2/m^2. Larch Corner exports energy, but operational energy is over the 2030 target at 43kwh/m^2/year. LEAP didn't remove the exported energy from operational energy.
- **Sustainability Standards:** Certified Passivhaus
- **Performance Gap:** Reduced to 0. The calculated heating demand was 14kwh/m^2/annum and the heating consumption in reality was = 14kwh/m^2/annum.

Image 106:
Entrance, Passivhaus Trust

Image 107:
Exposed CLT Interior, Passivhaus Trust

Energy Use

- **Heat Pumps:** Air Source Heat Pump
- **Renewable Energy:** 9.3 kWp photovoltaic array means the house generates more energy than required.

External Environment

- **Living Roof or Wall:** Green Roof

Accessibility

- **Accessible by All:** Wide corridors and level access from the parking area to the house (with the house all one level), so Larch Corner is accessible to all, including prams and wheelchairs. It is also future-proofed as can be adapted to different uses, Bed within storage wall. Electrical car charger is included, and was accounted for in the operational energy consumption calculation.

Construction

- **Lifecycle Carbon:** Cellulose/ sustainably sourced timber products are utilised throughout. The adoption of an all-timber construction over more traditional masonry has resulted in a reduction in embodied carbon of 40%.
- **Minimising Construction Waste:** Constructed using cross laminated timber (CLT) which is prefabricated. Whilst CLT is quick to erect, on a project of this scale, timber I-beams would have been preferable as they make more efficient use of resources.

Image 108:
Celebrating Air Test Result, Passivhaus Trust

Project Details

- **Project Name:** Goldsmith Street, Norfolk
- **Architects:** Mikhail Riches with Cathy Hawley
- **Passivhaus Consultant:** Warm
- **Engineer:** (Structural) Rossi Long Consulting, (M&E) Greengauge
- **Contractor:** RG Carter
- **Completed:** 2019

Image 109:
Street Presence, Passivhaus Plus

Further Information

- RIBA Stirling Prize 2019
- Mikhail Riches: Goldsmith Street
- Passivhaus Plus: Goldsmith Street

Building performance

- **Form Factor:** From between 2.66 to 2.85.
- **Orientation for Solar Gains:** All houses and flats face South, with a 15-degree roof pitch allowing winter sun to hit the homes' south-facing façades to provide passive heating. Brise-soleil above windows and doorways shade the south facing windows in summer.
- **Fabric First:** Walls are 600mm thick, superinsulated, to reduce heat loss. The subsequent larger depth window sills double up as interior seats.
- **Window Design:** Windows are modestly sized to reduce heat loss in winter and heat gain in summer. The facade includes larger surrounds to the windows to maintain the desired proportions.

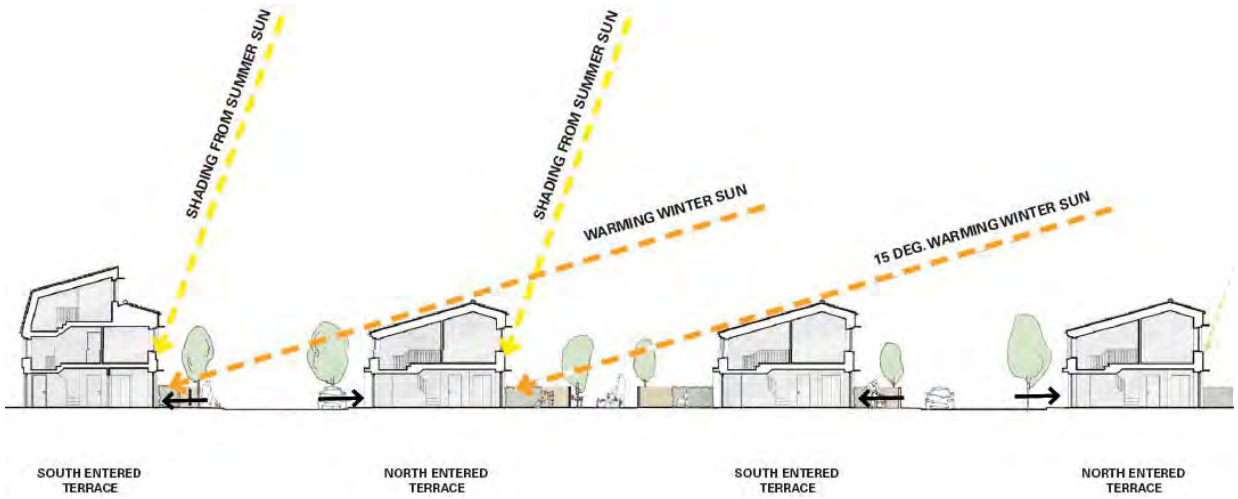

Image 110:
Roof/Shading Design, Passivhaus Plus

Image 111:
Central Landscaped Space, Passivhaus Plus

Image 112:
Secure ‘Alleyway’, Passivhaus Plus

Building performance

- **Airtightness / Air Tests:** Three air tests were carried out on each dwelling: the first when Cygnum completed their installation, the second after building services and windows were fitted, and the third on practical completion. The worst score was 0.63 ACH, the best 0.39 ACH.
- **Sustainability Standards:** On target to achieve full ‘Passivhaus’ Certification and understood to be the largest social housing scheme in the UK to achieve Passivhaus.

Energy Use

- **Renewable Energy:** There is scope for solar photovoltaic (PV) panels to be added to the south-facing pitches in the future, to bring the energy performance of the homes close to ‘net zero carbon’.

External Environment

- **Landscaping:** Existing green links are to be reinforced with a landscape scheme which extends beyond the boundaries of the site to include local roads and a park. A wild flower meadow is included in he central landscaped space.

Accessibility

- **Accessible by All:** There is a wide pedestrianised ‘alleyway’ which only key holders (residents) can access, with benches and planting, as well as other outdoor play spaces and landscaped areas which are accessible without crossing busy streets.
- **Bicycle Parking:** Each has a front door on to the street, a staircase and a ground-floor lobby for prams or bikes. Car parking is provided on the street, but there is a 20mph speed limit, so pedestrians are prioritised.

Construction

- **Locally Sourced Materials:** Interlocking clay pantile, grey facing brick and buff facing brick from Crest Brick Slate & Tile Ltd. East Yorkshire, with highly insulated timber frame structure by Cygnum, Suffolk. These materials reference the local area architecturally and provide the qualities needed to reach the Passivhaus standard - In addition, they are sourced from UK suppliers which reduces embodied carbon associated with transporting materials from further afield.

Project Details

- **Project Name:** Bicester Eco
- Business Centre, Oxfordshire
- **Architects:** Architype
- **Passivhaus Consultant:** WARM
- **Engineer:** Price & Myers LLP
- **Contractor:** Kier Construction
- **Completed:** 2018

Image 113:
Exterior View, ©KierConstruction

Further Information

- Passivhaus Trust: Bicester Eco Business Centre

Building performance

- **Sustainability Standards:** The UK's first non-domestic building to achieve Passivhaus Plus standard. BREEAM excellent.
- **Natural Materials:** Timber used in the wall build up (larson-truss infill panels), fins and internal finishes. Insulated with Warmcell. Hygroscopic walls and non-toxic bio-based materials. Low in Volatile Organic Compounds (VOC's).
- **Form Factor:** This 3-storey rectangular form has an efficient form factor, and its simplicity made it easier to achieve continuous insulation, minimising thermal bridges.
- **Airtightness / Air Tests:** Air test result of 0.59ach. The airtightness layer is located on the inside of the thermal envelope. The main building entrance is designed with a double door lobby to help minimise excessive heat losses. Learning from their previous Passivhaus scheme, Keir designated an on-site airtightness champion. Frequent site meetings between contractors, designers and consultants helped both to plan and minimise service penetrations through the building fabric, and also to optimise construction sequencing to assure airtightness details.
- **Daylighting:** Triple height top-lit atrium space, allowing daylight into the depth of the plan, and reducing excessive use of artificial light and energy.
- **Overheating:** The shading system of vertical timber fins and horizontal brise soleil (to the south facade) allows the building to have generous amounts of glazing affording natural daylighting whilst controlling the risk of overheating. Exposed internal concrete provide thermal mass to help the building regulate its thermal environment.

Energy Use

- **Heating:** Heat is supplied from the local direct gas district heating system which is located across the road.
- **Sustainable Lighting:** Lighting is provided with solar post lights which will guide users along paths and signify the car park entrance.

Image 114:
Rooftop Solar Panels, ©Jack Hobhouse

Image 115:
Landscaping, ©Jack Hobhouse

Energy Use

- **Renewables:** Whole roof is covered in PV panels. The balcony areas create additional roof area to maximise solar PV panel coverage.

External Environment

- **Sustainable Drainage:** SUDS strategy promotes the sustainable re-use of water and the gradual soakaway of surface water. The use of a loose gravel helps soften the building edge, whilst also providing a valuable drip line for the building. Levels are designed to allow surface water to filtrate into the planted areas where possible.
- **Landscaping:** The planting scheme is intended to add to the biodiversity of the surrounding area, improve the visual appearance of the site and add to its character. A number of native plant species have been selected alongside ornamental varieties.
- **Biodiversity:** The planting will provide habit for insects and nectar for bees through the flowering species. Linking to the existing planting along Pippin Street also helps to extend the green corridor.
- **Reducing Water Consumption:** Allowing water to permeate into the planting beds and using a gravel mulch to retain the water in hot and dry periods negates the need for automatic irrigation and using piped water.

Accessibility

- **Accessible to All:** Responds to duties under the Equality Act 2010, the requirements of Building Regulations, Approved Document M (ADM) and relevant local planning policy. This is supplemented by reference to BS8300:2009 Design of Buildings and their approaches, to meet the needs of disabled people.
- **Accessible Circulation**: The proposal designs out the need for internal/external ramps, with gradients that offer safe access for all users of the building. Corridor widths meet requirements set out within the Building Regulations. The stair, lift car size and clear manoeuvring space is designed to comply with ADM. Opening pressures, 300mm clear to leading edge, ironmongery, vision panels & manifestation all enable easy use of the building by all users.

Image 116:
Interior View, ©KierConstruction

Image 117:
Bicycle Parking, ©Jack Hobhouse

Accessibility

- **Accessible Sanitary Facilities:** Consistent location on each floor ensures ease of access and orientation within the building. All areas of the building are within 40m horizontal travel of wheelchair accessible provision on the same floor, and wheelchair accessible WC layouts are handed on alternate floors to allow for choice of left or right handed transfer as suited to individual needs.
- **Accessible Fixtures:** Fire alarms emit visual and audible signals to warn occupants with hearing or visual impairments. Ironmongery selected to be suitable for operation with limited dexterity.
- **Disabled Parking spaces:** 2 of 21 parking spaces are disabled bays, located close to the building main entrance, with clear level access.
- **Electric Vehicle Charge Points:** Electric charging points within the car park will promote the use of green vehicles within the site.
- **Public Transport:** A new bus service connects Bicester Town Centre, train stations, residential areas and the Local Centre.The bus stop serving the Local Centre is situated immediately outside the Eco Business Centre. A Real Time Information system within the building, promotes bus usage and enables people to plan journeys more efficiently.
- **Bicycle Parking:** 22no. covered cycle parking spaces, including a minimum of 13no. to be dedicated for use by staff of the Eco Business Centre, and the remaining available for visitor and general public use. Showers, changing facilities, and lockers provided for cyclists.

Construction

- **Sustainable Construction:** Contractors issued an Environmental Policy Statement to reduce carbon emissions, prevent pollution, reduce waste, conserve water, enhance biodiversity, use benign materials and minimise travel. They also recieved positive audits by the Considerate Constructors scheme.
- **Net Zero Carbon:** Passivhaus Plus certified, and therefore produces as much energy as it consumes (net zero carbon in use).

Introduction

On 8th March 2019, Herefordshire Council unanimously passed a motion declaring a Climate Emergency. This signalled a commitment to ensuring that the council considers tackling climate change in its future work and decisions taken. With this resolution came a county-wide aspiration to be zero carbon by 2030. From a planning perspective, it is therefore imperative that the council needs to demonstrate explicitly how the policies relating to climate in the adopted Core Strategy, SS7 and SD1, are being fully taken into account in the decision making process.

Policy SS7 sets out how the Plan will seek to address the impact that new development in Herefordshire has on climate change. It outlines how development proposals will be required to include measures to mitigate their impact on climate change at both a strategic level and through its design requirements for new developments.

Policy SD1 and its supporting text set out how new development will have to incorporate sustainability measures, and give consideration to climate change impacts through design. Alongside other aspects of sustainable design, in terms of climate change impacts, development proposals should incorporate the following requirements:

- utilise physical sustainability measures that include, in particular, orientation of buildings, the provision of water conservation measures, storage for bicycles and waste including provision for recycling, and enabling renewable energy and energy conservation infrastructure;
- where possible, on-site renewable energy generation should also be incorporated;

The policy's supporting paragraphs 5.3.31-5.3.33 elaborate on how this will be applied:

5.3.31 : All developments must demonstrate how they have been designed and how they have incorporated measures to make them resilient to climate change in respect of carbon reduction, water efficiency and flood risk. Carbon reduction should influence design from the outset by ensuring the fabric of the building is as energy efficient as possible, for example, attaining thermal efficiencies through construction that achieves low U values and fuel effciencies through the use of services such as effcient boilers. Good site planning can also aid greater energy effciency in new development, for example, by seeking to maximise solar gain.

5.3.32 : Revisions to the Building Regulations are introducing progressive increases in the energy efficiency requirements for new buildings. In terms of energy conservation, developments in sustainable locations that achieve accredited standards of energy conservation which cover a range of sustainability criteria will be supported, particularly where the level achieved materially exceeds the relevant Building Regulations and other relevant standards in place at the time.

5.3.33 : Large-scale developments should demonstrate how opportunities for on-site renewable energy generation and sustainable waste management have also been considered and addressed within the design of the scheme. Such details should include an appraisal of all suitable renewable energy technology. Other developments will also be encouraged to consider whether on-site renewable energy opportunities might be available. Alongside this, the council supports the provision of renewable and low carbon technologies within existing developments, subject to such proposals according with other policies of the Core Strategy.

This checklist has been prepared in order for applicants to demonstrate to decision makers that the policies have been complied with, in that sustainability measures have been incorporated in development proposals where possible. It should be submitted by the applicant as supporting evidence of compliance with the climate change mitigation criteria of policy SD1, supporting the objectives of policy SS7. In the event of non-compliance, sufficient justification would need to be provided as to why this is necessary. In the absence of this, the application will be refused on the grounds of being contrary to policy SD1.

All applications for all new build development (or at Reserved Matters stage if applicable) will need to submit information in the below table(s).

For clarification, the definitions of different development types are listed below:

- Minor scale housing development
  = 1-9 dwellings.
- Minor non-residental development
  = under 1000sqm.
- Major scale housing proposals
  = over 10+ dwellings.
- Large scale non-residential development
  = 1000sqm and above floor space.

Environmental Building Standards. Sustainability elements considered.	Tick where incorporated	Further details required
Building performance		
Site Context, topography and existing built and natural environment. Has the scheme considered the context of area from an energy perspective? Considered the shadowing from topography and existing buildings. Has there been analysis of prevailing winds, light quality, sun paths and locate climate, to create pleasant spaces between buildings?		
Has the scheme considered **optimising the massing of the building**, to ensure an efficient building design and placement. Has the scheme utilised the **form factor calculator** to assess the efficiency of development form?		
Orientation of scheme/solar gains. Has the scheme been located and orientated to maximise natural shading and solar gains? *Room design, position on site, window placement/design should be considered*.		
Has careful consideration been given to the **window design**, including placement, window frames and openings, proportion and specification to maximise solar gains/ daylight but minimise overheating?		
Has the scheme considered measures to **minimise overheating**, through use of thermal mass, shading mechanisms and window design? Has there been a review for the risk of overheating?		
Does the scheme include **mechanical ventilation with heat recovery**?		
Does the scheme include **natural ventilation** to all rooms?		
Has the scheme considered a **Fabric First approach** in its design and construction?		
Insulation. Does the development use **thermally efficient materials**?		
Has the development been designed to ensure **continuous insulation** can be installed externally, to minimise thermal loss? **& will it be detailed to minimise draughts**?		
Has the scheme considered **airtightness** in its design/construction? Has an airtightness target been set? If so what is this?		

Environmental Building Standards. Sustainability elements considered.	Tick where incorporated	Further details required
Will the scheme carry out an **air test** during and once the development is constructed?		
Has the development considered **using natural materials, finishes and fibres in its internal finishes and construction**?		
Has the scheme prioritised the **refurbishment and retrofit** of buildings where possible?		
Has consideration been given to the sustainability of building materials and their impact on the environment and **embodied carbon**?		
Has the embodied carbon in the scheme been assessed or will it be assessed, by using the **RICS whole life carbon assessment**?		
Does the scheme aim to meet the standards set out in the **RIBA 2030 climate change metrics** for buildings?		
Does the scheme aim to meet any other standards? If so, please detail.		
Will the scheme carry out a post occupancy evaluation and in use monitoring to assess the **buildings real life performance**?		
Energy Use		
Does the scheme include onsite combustion of fossil fuels, If so please explain why.		
Does the development include **efficient services** - does the scheme include energy efficient mechanical and electrical systems including LED lights, fittings and appliances?		
Renewable energy. Has the scheme included **solar PV or wind generation**?		
Heating. Are heat recovery systems included in the scheme? If so please explain.		
Renewable energy. Has the scheme included **solar thermal panels**?		
Renewable energy. Has the scheme included **heat pumps**? If so, which type? And does this meet all heating and hot water requirements?		

Environmental Building Standards. Sustainability elements considered.	Tick where incorporated	Further details required
Renewable energy. Has the scheme included **Biomass**?		
Has the scheme included **alternative low carbon heating systems such as hydrogen cells**?		
Does the scheme maximise **renewable energy through decentralised sources** - on site generation, community led initiatives and low and zero carbon technologies?		
What percentage of total site energy demand is produced from **on-site renewables**, in order to reduce dependence on carbon emitting sources?		
Has the scheme carried out **whole life cycle carbon and cost assessments**, assessing embodied carbon and operational carbon?		
What measures has the scheme used to **reduce the development's need for operational energy** above those mentioned in earlier sections?		
What other measures has the scheme used to improve the **energy efficiency** of the development that should be mentioned?		
External Environment		
Landscaping. Does the scheme consider landscaping to encourage new and enhance existing habitat/ biodiversity? i.e. wildflower meadows/wetlands/ bat boxes/marshes/local tree planting, establishing green corridors, integration of sustainable drainage systems.		
Has the scheme set out measures to achieve **Biodiversity Net Gain across the development**?		
Has provision been made to **minimise any impact on landscape** i.e. tree and hedgerow protection.		
Has **multifunctional green and blue infrastructure** been included in the scheme? If so, please explain.		
Does the scheme have a **living roof or wall**?		
Does the scheme include measures to reduce surface water runoff? Is **sustainable drainage** a part of the water management strategy?		

Environmental Building Standards. Sustainability elements considered.	Tick where incorporated	Further details required
Has the scheme included **rainwater harvesting** systems? i.e. water butts		
Does the scheme have provision for **greywater recycling**?		
Has the building been designed to include measures to **reduce water consumption**? i.e. low flush WC's		
Does the scheme have **provision for recycling / waste storage / composting**?		
Does the scheme include measures to **minimise light, water, noise, air pollution** during its use?		
Accessibility		
Does the scheme have provision for **secure bicycle parking/storage**?		
Does the scheme have provision for **EV charging onsite**? What percentage of parking spaces have EV charging?		
Does the scheme have access nearby to **public EV charge points**?		
Does the scheme have access nearby to **bicycle hire (i.e Beryl bikes)**?		
Does the scheme have access nearby to a **car share**?		
Does the scheme have access nearby to **public transport**?		
Does the scheme have access nearby to **community car share/ bike hire**?		
Is the scheme **accessible** by all?		
Construction		
How does the scheme intend to **minimise construction waste**?		
Will the scheme **reuse building materials (where possible) during the construction process**?		
Will **locally sourced materials** be used in the development?		
Does the scheme **calculate life cycle carbon emissions**?		
Will the scheme include a **site waste management plan, to minimise environmental impact from construction activities**?		

Planning Application No:	
Site/ Address of Proposal:	
Brief description of proposal:	
Type of application:	
Date:	

Introduction

The aim of the sustainability statement is for household developments to detail how they have considered sustainability throughout the development lifespan of their scheme, and how this intends to meet the highest standards of sustainable design and construction. A sustainability statement demonstrates how a scheme will address Core Strategy policies and guidance around sustainability, as set by the local authority.

The questions set out are for the applicant/agent to demonstrate where possible, how they will address specific topics set out in the chapters of the Environmental Building Standards SPD. The template is divided into five chapters, Building Performance, Energy Use, External Environment, Accessibility and Construction. There is a breakdown of questions for each of the sections, it is expected that the applicant/ agent will provide a response with the necessary amount of detail included. The applicant/agent can cross-reference any relevant studies/ plans and assessments to support their responses.

This template is expected to be updated and amended following following the Local Plan revision; the updated version is expected to set out local performance targets.

Please can the applicant/ agent provide their responses in the boxes below.

A	**Building Performance:** Has the scheme considered the orientation to maximise solar gains and natural shading? Does the scheme use thermally efficient materials and is it appropriately insulated? Does the scheme address airtightness and ventilation, both natural and mechanical? Has consideration been given to the sustainability of building materials and their impact on the environment and embodied carbon?
	Where appropriate please provide responses to questions here.
B	**Energy Use:** Does the scheme include onsite renewable energy generation? Does the scheme include efficient services, fixtures and fittings? Is there a low carbon heating system included in the scheme?
	Where appropriate please provide responses to questions here.
C	**External Environment:** Does the scheme include landscaping to enhance habitat and biodiversity of the site? Does the scheme have green roofs/walls? Does the scheme included sustainable drainage to reduce water run off? Does it include rainwater or greywater recycling systems? Has provision been made for household recycling/ waste storage/ composting?
	Where appropriate please provide responses to questions here.
D	**Accessibility:** Does the scheme provide cycle storage and EV charging points?
	Where appropriate please provide responses to questions here.
E	**Construction:** Will the scheme include measures to minimise construction waste in the build process? Does the scheme include measures to reduce light, water, noise or air pollution? Have features been included to monitor the building's efficiency once complete?
	Where appropriate please provide responses to questions here.