A multi-award winning architect with some 11 years post Part III experience, Gil is nationally respected as a highly-experienced specialist in low energy, ecological design for both retrofit and new-build projects. He is also experienced in the heritage sector and site master planning. His varied portfolio showcases a range of clients across the UK from commercial, community, charity and domestic sectors.

Gil's passion for green design was sparked at Nottingham University under eco gurus Robert and Brenda Vale. In his year out, Gil worked hands-on at their groundbreaking Hockerton Housing Project. Gil isn't just a designer of green buildings he is also a pioneer of the eco retrofit movement. He co-owns the Nottingham Ecohome the UK's first significant whole house eco renovation of a Victorian Villa.

Gil strongly believes in the power of exemplars to transform society and in the importance of communicating and sharing information as widely as possible.

Over 1,000 people have visited his home which has been featured numerous times on TV and in international press.

Having advised many clients during his 12.5 years at heritage specialists MSA, he has been running his own practice since 2010. Recent projects include:

- Several eco extensions in and around Nottingham
- Two whole house retrofits in Nottingham, designed with the super-efficient Passive House methodology and to the EnerPHit standard, each costing less than £200 / year to heat - a reduction of over 85%
- A multi-award winning community new-build teaching and site facility for Arkwright Meadows Community Gardens
- St Nicholas Church refurbishment, Nottingham, CAD / second project architect,
- A domestic extension for private clients to help cater for their young daughter with severe disabilities.
- Energy saving measures for a Grade II listed farmhouse, Norfolk and redevelopment of associated farm buildings.
- A whole house energy renovation of a 19th C farmhouse in the Peak National Park for the Peak Park Authority

Gil is a long standing member of the AECB, the green building organisation and currently runs the Nottingham/ East Midlands AECB Local Group.

Key awards:
- DECC Retrofit Pioneer 2012
- Sustainable Water Industries Group Award for Domestic retrofit 2013
- Notts Wildlife Trust Environmental Business 2013
This was an early 1950s detached house of 80 m² and east-west orientation. The external walls were solid and the property was virtually un-renovated since it was built, with the original kitchen and fireplace stoves. One of the few previous additions was a gas boiler and central heating, which was old and failing. The windows were original timber single glazed and had taken in water, expanded and would not open. This was compounding the already cold and damp conditions which the clients had to endure for two winters. This experience galvanised the clients into wanting to carry out a more radical energy retrofit.

GSD was commissioned initially to thermally model the building using SAP and identify possible measures. The PH modelling revealed that despite the unfavourable orientation it may be possible to achieve the new PH retrofit target, EnerPHit subject to air tightness. The PH modelling allowed us to optimise the measures and adapt the approach to the practicalities on site.

First some internal walls were removed and rear openings altered. The original ground floor was mostly suspended timber with solid floor under the kitchen. This was all removed and excavated to allow a 300 mm thick new layer of Platinum EPS insulation, including provision of vertical downstand insulation all the way down to the footings against all retained walls to reduce thermal bridging. A new concrete slab and screed followed, with each layer carefully sealed with expanding foam/special tape for air tightness. The extension was treated similarly, except for the use of structural insulation in the blockwork instead of downstand insulation.

With the roof the original idea was to provide a room-in-the-roof loft conversion by adding a new dormer and a hip-to-gable conversion. Given the amount of work required to the existing, it was later decided that it would be better to remove the whole roof and start again. All new steelwork and deeper rafters were installed with 100 mm rigid PIR sarking insulation fixed over the rafters through couterbattens. The roof underlay acted as a secondary air tightness membrane and was taped throughout including a special cleaved detail at the eaves which ensured both air tightness and correct water runoff. The rafter zone was insulated with enhanced performance glass fibre insulation and then under drawn with a taped primary air tightness vapour check membrane. This was left exposed for the first air tightness tests so leaks could be accessed and put right.
Chimneys were removed, including external breasts all the way down the wall. Abutment and eaves details had to be carefully designed and planned to minimise thermal bridging and on-site full size mock-ups were used to refine these. Windows and doors were from the Ecopassiv range at Green Building Store and contain a sandwich of insulation within the timber frames and are factory finished with two seals, triple glazing and paint. The walls were clad externally with EWI (external wall insulation in 2 layers of 90 mm phenolic foam with a thinner layer taken below ground to footings. Windows and doors were mounted in plywood surrounds that pushed them 90 mm into the EWI zone to maximise efficiency. The second EWI layer additionally covered some of the frame edges to further improve performance. All openings were made inward to facilitate this detail. EWI was finished mostly in white render but the planners insisted on some brick appearance on the front. The circular bay was rebuilt rectangular to assist detailing and this new bay had its EWI finished with brick slips less than 10 mm thick. Some European green oak cladding was used to accent the materials on the gables. Internally, walls were wet plastered for air tightness and special lap details created at the eaves and floor junctions to ensure even better seals. Air tightness testing identified the less obvious leakage areas initially missed and most were put right before covering over window reveals and sloping ceilings with plasterboard. The final AT result was around 1.1 ach which is just short of the PH target of 1.0. The clients may make further improvements and go for certification in due course. The heating is conventional gas boiler with 5 small radiators. 3.25 kWp PV on the south side provides more income than the entire energy costs of the house so the house is cost-positive. The skylight is quad glazed and PH certified by Fakro.

Thermal Modelling: SAP/NHER, PassivHaus Planning Package, Therm

PHPP Modelled Space Heating Target: 25 KWh/m2/year
(Retrofit target = 25 and New Build = 15KWh/m2/year)

External Joinery: Green Building Store Ecopassive (PH Compatible)

MVHR: PAUL Focus 200, galvanised ductwork
While this house achieves energy savings of over 90% and is also ‘cost-positive’, the benefits of the Passivhaus approach have been far more than financial. Year-round comfort levels are very high and robust construction and modelling has removed the performance gap whereby buildings tend to use more energy than predicted. Here the reverse is true, with the first year computing at 27 kWh/m².year and second year at 23 kWh/m².year. This pioneering extreme energy refurbishment has succeeded in providing a larger modern dwelling (140 m²) which will meet the needs of the occupants well into the future and provides a strong aspirational model for future energy refurb.
Gil was engaged in 2006 after winning a limited competition to design a green site facility for a community garden. The group were in receipt of a feasibility grant from the National Lottery. The scheme was developed with no budget stated and initially included various technological as well as fabric features. After costing and the group’s attempts to gain funding it was agreed to streamline the design to its essence while retaining its most important features. This crystallised a ‘fabric-first’ approach whereby optimising insulation, thermal mass and air tightness and providing heat recovery ventilation the combined build and running costs can be minimised. Among the non-essential measures that were discarded were solar thermal, mains gas connection, heat pumps, wood stove or boiler, central heating, timber frame or straw bale walls and a living roof. The project would prove to be all the richer and more elegantly eco-minimal.

A grant was finally secured from the Big Lottery Local Food grant, topped up by a landfill grant in 2010.

As the initial feasibility budget did not allow for early ground testing the initial costings on which grants were awarded assumed normal ground conditions. Unfortunately when pre-construction ground testing was carried out conditions were found to be very poor due to previous development. This meant that standard footings would not be adequate and there would be no way of asking for more money to cover anything more elaborate. So various options were considered including piles and very deep trench footings. A thick highly reinforced concrete raft in combination with a process of ground improvement was chosen for cost-effectiveness and ease of low-energy detailing.

Construction finally started in Autumn 2010 and the gardens remained open throughout the build.

The reinforced raft was stepped at the edges to allow the brickwork to extend down to ground level while the internal floor is elevated to reduce flooding risk. A flood-resilient plinth was constructed with exposed brick and higher grade insulation and plaster. Floor insulation was laid over the raft followed by Eco Screed. The internal blockwork walls included structural insulation strips at their bases to reduce thermal bridging. The walls and floor serve as giant background heat stores which moderate internal temperature fluctuations and maximise the usefulness of passive solar gains.

External windows and doors were manufactured locally in exposed Douglas fir to bespoke advanced specifications including high spec triple glazing with plastic spacers,
two weather seals for air-tightness and wheelchair accessible thresholds. All are inward opening to allow the recessed external reveals to be insulated to further improve performance. External cill are powder-coated metal for the windows and chequer plate anti-slip aluminium for the doors. Window surrounds were sealed internally with membranes and air-tightness tape worked into the plaster finish to complete the seal.

The flat roof was constructed with 300 mm deep engineered timber i-joists. These can be cut in certain locations which usefully meant that the heat recovery ductwork could be fitted within the joist depth, as could other services. The roof air tightness membrane was placed above the structure so that these services do not compromise it where they penetrate. 300 mm Platinum EPS insulation on an OSB timber deck above the joists complete the highly insulated envelope and the weathering layer is single ply membrane which could take a green roof in the future. The overhanging roof edge is formed into a timber parapet clad in untreated Scottish grown European green oak which will gradually weather to a silvery colour.

Heating is minimal and provided more by internal and solar gains than by the backup direct electric radiators. The efficient heat recovery unit is virtually silent, costs £20/year to run and recovers around 90% of the heat normally lost in natural ventilation and air leakage.

Funding: Big Lottery Local Food award, Biffa fund
Lighting: Fluorescent strips. CFLs and LEDs, occupancy sensor in WC
Air Tightness: 1.35 m3/m2.h @ 50 Pa
MVHR: Itho ECO 4 with rigid plastic ductwork
Heating / Hot Water: direct electric  Cooking: Bottle gas
PV: 2.5 kWp on ballasted trays laid on roof
Substructure / Floor: ground improvement compaction, sub-slab, 300 mm insulation thick reinforced concrete raft, edge insulation, Eco screed

Walls: Cavity walls with 250 mm insulated cavity

Roof: 300 mm i joists, 300 mm Platinum EPS insulation, single ply membrane

External Joinery: Locally made Douglas fir triple glazed, plastic spacers, two seals, insulated reveals

PV panels are laid on special plastic trays that are ballasted with gravel on the roof so that they are secured without piercing the roof. Lighting is provided by good daylight and a mix of fluorescent bulbs and LEDs. Very good air tightness allows the building to perform as efficiently as predicted with constant year-round comfort, low running costs and sense of wellbeing. The building is successfully used for day-to-day running of the gardens, training and demonstrations, social and event space as well as hire room for the wider community. It is popular with staff, volunteers and visitors alike with its sense of elegant transparency and site integration shining through. The garden has won several awards including local Notts Wildlife and Nottingham Post awards, and most recently a national award for Best Community Garden.
Originally a Victorian coach house to the nearby manor house, this building was converted to a dwelling after the war. It subsequently received a major renovation in 1990 when an upper floor within a masard roof was added, bringing its floor area to around 150 m². The current owners bought the property with the idea of carrying out an advanced low energy refurbishment. GSD was involved at every stage, from advising on potential strategies pre-sale to handover and beyond. As the house is within a conservation area, it was decided that the majority of the energy efficiency measures would be applied internally so as to preserve and enhance the beautiful exterior. Key to the ultra low energy strategy was to super-insulate without major gaps. This would mean gutting the existing house removing all cold-bridging cross walls and leaving only the upper timber floor in place. Once this was agreed it paved the way to remodel the whole interior with the Passivhaus target as the driving force. Some 500 mm of insulation in the loft, up to 270 mm on the walls and 250 mm in the brand new ground floor, plus triple glazed windows with insulated frames line the historic structure. Two air tightness barriers and a lot of attention to detail coupled with Mechanical Heat Recovery Ventilation, have made it possible to avoid central heating. A wood burning stove is used for backup. Roof integrated flat-plate solar thermal panels contribute to hot water demand and PVs are planned for the out house roof. LED spotlights have been used throughout, including some dimmable, while cooking is via induction hob and electric oven, so no mains gas is needed.
Water efficiency has also been considered with spray taps and ES4 leak free 4 litre flush WCs.

The PassivHaus Planning Package methodology was key to the design development and a PHPP consultant was appointed to model the measures and construction details. This revealed not only that a space heating target which exceeds the new PH retrofit standard was possible but that a result within 20% of the PH new build standard was possible. Insulation was increased in some areas and some of the junction details were further improved to reduce thermal bridging. Existing south facing window openings were enlarged and new ones added to maximise the passive solar gains.

The PassivHaus approach is robust and its dependability has been proven through many monitored case studies. It is a quality assured methodology that just works.

A major resource for this project was the Green Building Store who designed, supplied and commissioned the PAUL MVHR system which is over 90% efficient, as well as supplying the PH compatible joinery, air tightness membranes and tapes. Service voids in the multi-layered construction allowed for penetrations through the membranes to be minimised and sealed at least twice.

Despite the addition of some renewables, the clients understood the most effective investment would be in the largely unseen elements of the fabric of the building; these will continue to work passively and innately long into the future.

The unique nature of this project meant that attention to detail was key. It also required tight site supervision, inventiveness and a real sense of teamwork with the client and contractor to fully realise such an ambitious project.

The result is a stunning two bedroomed, eco minimal dwelling that expresses the clients’ vision of their home and lifestyle. The ground floor houses the sleeping quarters and bathrooms. A bespoke timber feature staircase leads to the upper level. The main living area is open plan containing study, lounge and kitchen areas. High performance sliding doors lead from the living floor out onto a balcony to access the upper garden. The whole impression is of space, airyness and simplicity. Much of what makes the house work on an eco level is hidden, allowing greater flexibility in the use of space, both now and over time.
PASSIVHAUS WHOLE HOUSE REFURBISHMENT

Location: Mapperley Park Conservation Area, Nottingham

- solar hot water
- and heat recovery ventilation

- wood stove occasional heating

- en suite wc

- stair and front door

- stair and front door

- interior view facing front door and stair

- interior view facing courtyard

- new window detail south side

- south side view

- east side detail
When the clients, a young family in Derby, approached GSD Architecture they were looking to extend their modest Victorian terrace to give them substantially more room, with a view to upgrading the existing poorly insulated house later. As well as appreciating the benefits of robust low energy design they were very interested in natural ecological construction and finishes, so the challenge was to marry the two, satisfy the planners and keep the budget down. The clients had been on straw bale building courses and were keen to carry out the project as a self-build with much of the work done by them. The design consists of a two storey timber framed structure, infilled with a mixture of super insulated timber frame and straw bale walls, triple glazed windows and finished with a wild meadow roof. The roof is flat, with a sloping triangular corner, designed to reduce impact on the attached neighbours, into which is placed a bank of triple glazed skylights.

Despite its unusual and radical appearance the planners praised the design and passed it without any issues, showing keenness to support such a forward looking project.

The detailed design also includes whole house heat recovery ventilation (MVHR), great attention to minimising thermal bridging, and careful use of membranes and tapes to achieve a very air tight space. The timber for the main frame was sourced near Sheffield and much of it will be left exposed internally.

Construction began in summer 2010 and is expected to be complete by the end of 2015. The roof planting was plug planted with native species and sedum in 2012 and is now established. It provided a useful shelter for storing vulnerable materials such as straw bales. As of July 2015 much is progressed or finished but there are a few items to finish off and much to clear. The clay plaster was mixed from clay dug on site.
ECOLOGICAL ULTRA LOW ENERGY EXTENSION

Location: Derby
Clients: Private
Procurement: Self build
Completion: 2015

clients standing in the kitchen to be

client standing on roof with view of nearby church

rear view in progress
ECOLOGICAL ULTRA LOW ENERGY EXTENSION

July 2015 in progress photos:

Above: wane edge boarding and lime render on straw bales advanced. Roof edge cladding and top coat render still to be done

Below: exterior detail (Juliet balcony and roof edge yet to be done) and ground floor interior looking outwards

Below: Interior. Clay plaster made from clay dug from rear garden. Steel and glass interior balcony contrasts with natural materials.
REAR KITCHEN EXTENSION

Location: Selby Road, West Bridgford, Nottingham
Clients: Private
Contract Value: £70 K
Completion: April 2014

The clients needed a kitchen extension that was warmer, maximised daylight and views of the garden while working within the context of a period property. They also wanted a utility laundry room that linked to the rear of the garage.

A delicate balance is stuck between well insulated solid surfaces and glass. To achieve maximum comfort and efficiency levels the glazing has to work hard. All high spec triple glazed from the Green building Store with overall U value of 0.81 (twice as insulating as Building Regulations require), the large sliding doors weigh in at 300 kg and special planning was needed to install. They are timber, painted externally and clear coated internally. A steel and glulam frame supports the bedroom bay above to allow opening up below. The extension and original kitchen received new insulated solid floor with underfloor heating to free up the space and ensure efficient comfort. Stone tiles unify the space. The new walls are well insulated and air tight timber frame constructed with untreated green oak. Roof is finished with recycled plastic interlocking slates and a motorised triple glazed skylight.

The result is elegant, light and transformative with a delicate blend of hard and soft, opaque and transparent. The panoramic views without compromising comfort and finishes make this a delightfully sensitive intervention.
The client wanted to carry out an energy efficiency refurbishment on a single room and it was logical for this to be the living room as this is the room where most time is spent. She also wanted to remodel and update the fireplace / TV area. Measures undertaken:

- High performance suspended floor insulation and air tightness.
- High performance laminate internal wall insulation and window reveal air tightness and insulation.
- Roof insulation in lean-to part including insulating beam.
- New fireplace with efficient fire, radiators replaced with smaller.
- Single glazed side windows replaced with new timber double glazing incorporating the original stained glass panes.
Finished view showing new fireplace and side windows - result unobtrusive with energy efficient elements largely invisible - room much warmer in Winter than the rest of the house with little heating required. Client so happy with result she wants to buy a laptop so she can also work in the new living room. Attention to detail and good workmanship makes a big difference to finished result.
The clients have lived in their classic Victorian villa for over 30 years and approached GSD Architecture to prepare a design for an extended kitchen and entertaining space.

The rear of the existing house narrowed for the kitchen, leaving an adequate but not generous terrace to extend into. The design allows for the extension with a reasonable path width to the side. A timber frame wall construction was favoured for its ecological advantages coupled with its ability to achieve better insulation within thinner construction than masonry. The Timber cladding is Scottish grown FSC certified green oak with fixings hidden behind timber plugs. The roof has a gentle 9° slope to avoid the upper floor windows of different heights and is finished with the thinnest and lightest type of green roof - sedum - which is also very drought resistant and offers very low maintenance. Flush triple glazed skylights bring more light into the centre of the plan and triple glazed windows capitalise on the views and the solar aspect. While oak is durable without any treatment, the clients preferred it to stay as its original colour rather than fade to a silvery grey so chose to coat it in a light stain.

The result is a modest extension that marries well into its context and compliments its parent building rather than attempting to compete. Internally, the feeling is of spaciousness, views and a good balance between natural light and solid surfaces. The clients are delighted they now have the space to entertain their friends and family and feel it has transformed the way they live.

Location: Lady Bay, Nottingham
Clients: Private
Procurement: Traditional
Contract Value: £70 K plus VAT
SMALL LOW ENERGY EXTENSION

Location: Lady Bay, Nottingham
Clients: Private
Procurement: Traditional
Contract Value: £70 K plus VAT

a space for entertaining - looking from rear French windows to old part of the kitchen

looking from the original living room into the extension